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WAR ON WASTE

Saves $542,000 at

Oakland Motor Plant

By Ray Chalmers

Oakland Motor Car Company

A vigorous campaign produced 272 slogans, 72 articles on waste, 125 exhibit boards, and 3,558 suggestions, estimated to save ultimately over a million dollars

CAUSES behind the Oakland "War on Waste" were no different from those existing in most other automobile plants. Oakland had increased its stride of production so rapidly that no time was available to stop to organize all the details of manufacturing. There was but one motive—to forge ahead to keep up with the pacemaker, demand.

Fortunately, Oakland had, among its executives, that mental balance and deliberation that, while at times seeming to put a check on those of the optimistic and impulsive type, nevertheless, in the end, proved its value by assuring sound and methodical progress. It was due mostly to this type of man that attention was called to the killing pace that Oakland was setting At any rate, too little attention was being paid to the undesirable results brought about by the lack of balance between intense production and the contingent items of avoidable waste.

Consequently, at a meeting of the superintendents, during one of those reflective moments when we all slacken our speed just a little for a second wind, and gage our pace by what lies ahead, the subject of waste was broached. The consensus of opinion finally reached was that a "War on Waste" was justifiable. On April 24, 1929, "war" was declared by the executives in conference assembled. "M day" was set for ten days hence.

A "staff colonel" was appointed and dispatched to Washington for assistance. All available data on previous "wars" was collected. Then "staff officers" were selected and called together to confer on a plan of expediency. The next step was to organize three major divisions to conduct the drive—publicity, exhibits, and suggestions. Under these divisions, "commands," selected for their enthusiastic effectiveness, were ordered to report for duty. Two newspapermen and an art man

REFLECTOR
WAR AGAINST WASTE DECLARED
$1,247 in Prizes
Enlist Workers In Whole Plant For Active Duty
'GIVE NO QUARTER'--WAR CRY
TEAM WORK WILL WIN
FOX FIRST WITH WAR SUGGESTION
MACHINE GUNS TO SLAY WASTE
Intensive Warfare Opens With Guns at Noon
LESS WASTE--MORE JOBS
Educational Dept. Leads Field With 595 Points
MACHINE GUNS SMASH FOE AS VOLUNTEERS START LAST WEEK OF WAR UPON WASTE

Fig. 1—A daily newspaper was issued during the "War on Waste" and is now to be continued on a weekly basis

Declaration of War

WHEREAS:—There have grown up with this industry, and entrenched themselves firmly within its lawful domains, certain lawless and disturbing elements; and

WHEREAS:—Said elements are in continual and persistent conflict with our march of progress, and

WHEREAS:—Said elements having flourished undisturbed have grown to the point where they now threaten the peace and security of our business, the successful and orderly pursuit of our labors, and have constituted themselves a menace to our future prosperity, and

WHEREAS:—They have established themselves in defiance of all regular and authorized laws governing the conduct of the business of which we are a part

WHEREFORE, BE IT RESOLVED:—*That we, the officers and employees of the Oakland Motor Car Company, this sixth day of May, nineteen hundred twenty-nine, through our regularly constituted representatives in convention duly assembled, do hereby declare war upon the aforesaid offenders—Namely, Extravagance, Inefficiency and Waste; and do pledge all our physical, and such financial resources as may be necessary to wage to successful conclusion this war against them, to the end that we may again be free and undisturbed in the happy pursuit of our labors, and the permanent possession of the benefits which must acrue from a successful prosecution of this war.*

Signed:

G. LEFEBVRE,
General Chairman

Fig. 2—To get the message across effectively to the workmen a formal "Declaration of War" was issued by the vice-president in charge of manufacturing, who was chairman of the Waste Week Committee

were temporarily engaged. The staff officers outlined the plan of operations. Oakland began to mobilize its "army."

The attack was to be on five "sectors," or burden centers—two assemblies, motor assembly, axle and transmission assembly, and sheet metal fabricating. Each plant division was equipped with the implements of war in the form of 4x6-ft. double-sided exhibit boards. Hectic days and nights were spent at a centralized "training quarters" stacking up "ammunition" for the boards. Relics of the depredations by "Waste" from "Devastatia," "Carlessonia," and all other countries of the "Wasteful Empire," were displayed as an incentive to fight the foe. Almost overnight, 125 "tents" in the form of exhibit boards arose, all covered with relics representing visible forms of depredations by the enemy.

Fig. 3—Cartoons played a prominent part in the campaign. They were hung in conspicuous places, such as under the electric lights

The award staff drew up documents for delivering suggestions, the most deadly "ammunition" against waste. They also provided for medals in the form of United States greenbacks, totaling $1,247, as citations for "bravery in action."

The publicity staff stimulated "recruiting" by many pertinent posters, hung in large numbers throughout the plants. These were made up with war scenes in colors as backgrounds, and snappy slogans were printed on them, calling for "volunteers." A public-address system was installed with loud speakers at various places. Noonday music was furnished and speeches were made by both "commanding officers" and "privates." A sham battle was staged against the "Waste Entente" by the Michigan National Guard, and 20,000 rounds of real machine-gun bullets riddled the enemy trenches and annihilated the enemy. This brought out practically the entire shift. The commander-in-chief then gave an address to the "army." The big drive which brought in 3,358 suggestions was on!

A daily newspaper was published, containing all the latest bulletins of activities. The general staff issued a series of challenges stressing the four major grievances against "Waste," and the commanding officers took up these challenges and replied with recommendations for strategic moves along the battle-front. Soon the idea spread and rookie privates were contributing. A suggestion for saving $5,900 put new zest into the drive. The scoreboards told of the daily "victories" under the various "commands." Cartoons depicted the less serious side of the "war." A daily strip, "Lives of Great Men," inspired the men to greater endeavor as they saw, in picture form, the rise of their "superior officers." "Herlock Sholmes, the Correspondence School Detective," was the army fool, and pursued "Waste" wherever he wasn't. Many issues contained picture pages of major events, exhibit boards and shop conditions. Contributors pictures were published along with their articles. Final editions announced the winners of citations, and recounted their accomplishments. The paper is to be conducted permanently along the same lines, in weekly issues.

The following were listed as the subjects on which suggestions were desirable, in three major fields, classified under the headings of apparatus, factory and office conditions, and miscellaneous items, but anyone was at liberty to submit ideas on any other subject. Apparatus covered quality, cost, quantity, simplicity or reliability, packing or shipping, handling, finish, design, workmanship, material. Factory and office conditions covered health, cleanliness, sanitation, ventilation, order, prevention of fire, prevention of accidents, lighting, power, economy. Miscellaneous items covered machines, tools, operations, jigs and fixtures, templets, transportation of material, handling of material, storage of supplies, system and methods.

The special cash prizes offered in connection with the "War on Waste" were:

Best composition on waste elimination, not to exceed 500 words: First prize, $15; second, $10; third, $5; total, $30.

Best slogan: First prize, $10; second, $5; third, $2; total, $17.

Exhibit boards displaying the greatest amount of "ammunition" for War on Waste, loving cups.

Grand prize, all "sectors," $100. In each "sector" prizes were as follows: First prize, $50; second, $30; third, $20; fourth, two prizes, $15 each; fifth, four

Table I. Cost of "War on Waste"

1. Publicity service, 12 issues of the "Reflector"		$2,000.00
2. "Reflector," printing 11,000 of each of 12 issues		1,850.00
3. Artwork, covering "Reflector" headpiece, retouching, cartoons, posters, "Famous Men" biographies, "Herlock Sholmes," approximately 135 items		2,376.00
4. Posters, five backgrounds and 4 slogans, 200 each of 20 designs in 3 colors	$1,693.50	
Poster cartoons, 200 each of 6 designs, 4 and 5 colors	1,521.10	
Slogan cards, 200 each of 1 design and 1 color	37.50	
Wrapping and mailing	7.50	
Total, posters and cartoon cards		3,259.60
5. Photographic work, covering approximately 400 negatives, 985 prints, kodak work and photostats		1,012.19
6. Cuts, covering 164 halftones and line cuts		770.70
7. Printing, miscellaneous		10.25
8. Newsboys, to distribute papers		109.90
9. Exhibit boards, covering lumber, labor and signs for 125 boards		1,584.57
10. Banners, two 4 x 24 ft., with 30-in. letters		70.00
11. Miscellaneous items		87.65
12. Public address system, complete with operator, two weeks; electric pick-up for Victrola; extra horn		270.00
13 Traveling expenses to get data to start compaign		100.00
Total for "War" proper		$13,500.86
14. Balance to complete campaign, including publicity service, "Reflectors," 4 issues, photographs, cuts		1,419.50
15. Prizes		1,247.00
Total cost for "War on Waste"		$16,167.36

prizes, $10 each; sixth, ten prizes, $5 each; total, $220 per sector, or $1,100 for the plant.

Total of all prizes, $1,247.

All of the above activities were organized through a manual of procedure. The first section of this manual outlined the plans for the campaign and the division of the plant into sections. The second part described the organization and work of the publicity staff, consisting of two men from the company and two from outside. The next division covered the duties of the exhibit staff. The final section outlined the functions of the suggestions staff, and the system of making awards.

When the "War" was over, the really hard part of the campaign began—that of judging the prize winners. To select a winning exhibit board from 125 double-sided displays was no small task. Awards were based on neatness, originality, exposition, and value represented. The winning board was exhibited by the Oakland plant millwright department. One side represented an "organization chart" captioned, "Use It Right. Stop the Waste." Below, the notation showed that $98,000 per month was spent for the items listed. Next were four main brackets, "Get It, Use It, Take Care of It, Save It." The other side was entitled, "Not a Part of the Car but a Part of the Cost." Various items selected were priced in detail. Water, air, steam, coal, and electricity showed a total cost for 1928 of $944,000, and 10 per cent wasted would be $94,400 for the year.

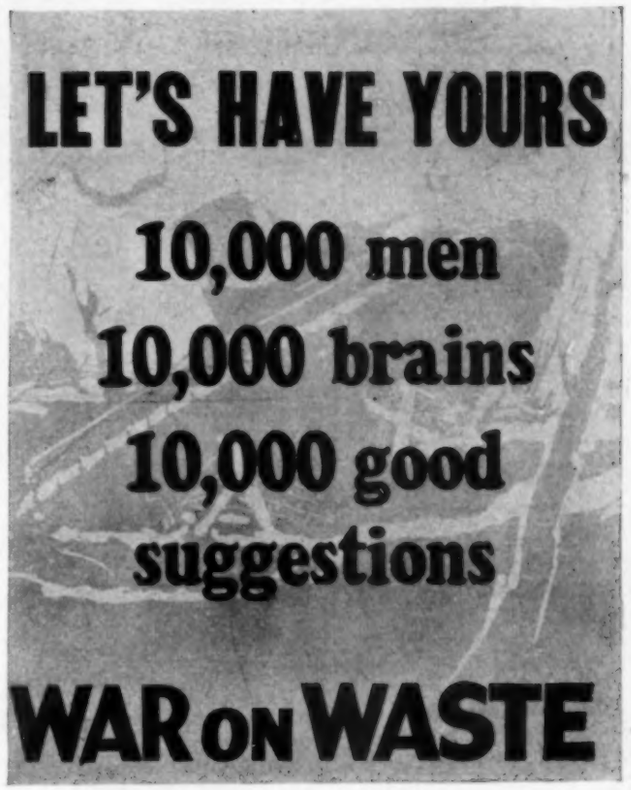


Fig. 4—Posters with war backgrounds, in colors, and carrying forceful messages regarding the campaign, were also liberally distributed throughout the plant

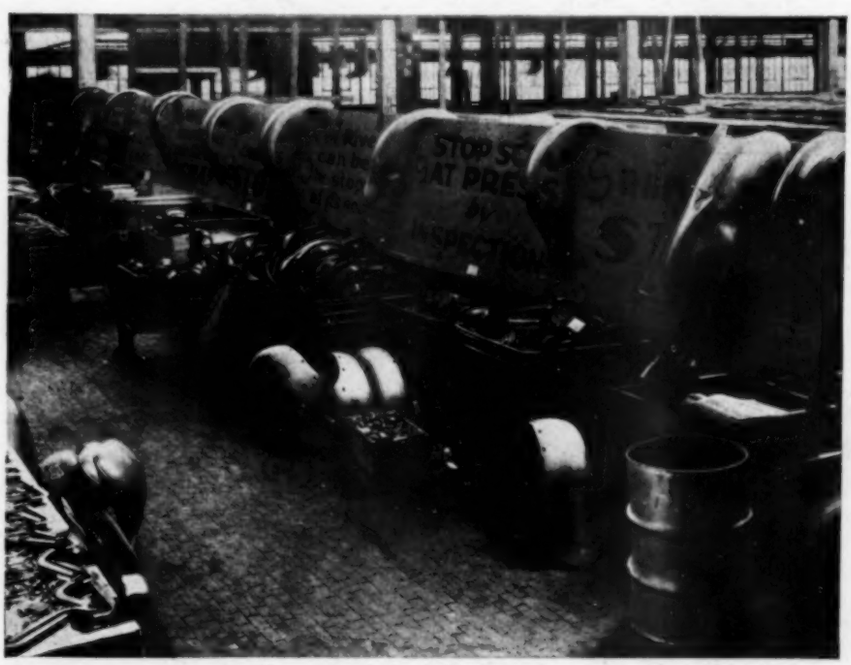


Fig. 5—Exhibits of waste proved to be the greatest stimulus to thought and suggestions along the line of preventive measures. In the sheet metal department boxes of scrap, properly labeled, called attention to preventable losses

The second prize exhibit showed comparable conditions, balanced on each side of a center line. To the left was work done by the "Busy Bees," and to the right that done by the "Drones." The Busy Bees had perfect car parts on a clean background, while the Drones had similar parts on a mussy background, and the parts were bent or broken.

In all, *272* slogans were submitted. The winning slogan was, "If you came here to save, stay. If you came here to stay, save." The second prize went for, "Plan your work. Work your plan." The third prize was won by, "A good inspector finds scrap, in order that less scrap will be made."

Seventy-two written articles on waste were turned in. The prize-winning article, "You Are Paying for Waste," clearly and logically made

Fig. 6—Exhibit boards were constructed for the use of individual departments, and 125 such boards were fitted out and displayed during the campaign. They carried exhibits on each side

Fig. 7—This board won first prize for exhibits. It analyzed the causes and prevention of waste in a form similar to an organization chart. Alfred P. Sloan, President of the General Motors Corporation, considers this line of thought one of the most remarkable developments of the campaign

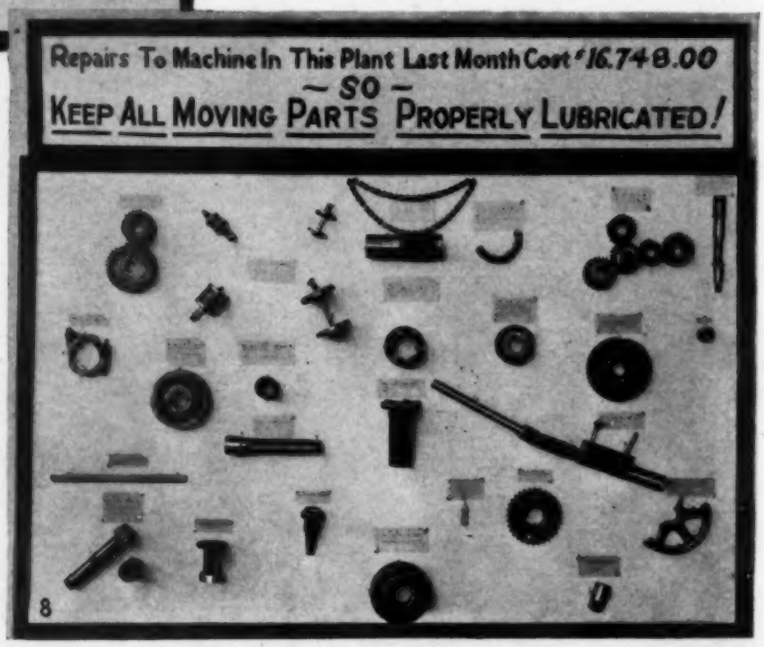
Fig. 8—In a large plant, machine repairs are often the source of big losses. The machine repair department showed on this board the damaged parts it had been called upon to fix or replace

the point that the law of compensation applies continually and inevitably to the matter of waste. It showed that whenever anything is wasted, not only the one who causes the waste, but others also, must pay the loss which follows.

The second prize for an article was awarded for an item on "Dormant Brain Power," which pointed out that, "Our problem is to awaken all the dormant brain power in our organization and utilize it in stamping the life out of this snake in the grass, Waste." The third prize was for an article on "Waste, Its Elimination from Industry." The author pointed out the increasing need for eliminating waste as industry becomes more highly developed and competitive, and urged a frank, confidential relation between workmen and employer as the best means for achieving the end.

The suggestions were sorted according to their application to departmental functions, or to burden centers, represented by commanding officers. These suggestions were then examined by the commanding officers and the good ideas selected from those obviously worthless. This sorting reduced the total for committee consideration to about 35 per cent of the original number. In other words, 35 per cent had merit enough for shop investigation. More detailed examination showed that there were scores of suggestions, any one of which would more than pay for the entire cost of the campaign. Ninety-five winners had to be selected, and after three weeks of concentrated effort on the part of the entire committee, working nights and Sundays as well as a considerable part of the daytime, these winners were chosen.

The grand prize of $100 was awarded to Chester J. Flynn of the Standards Department, for his clear, detailed and carefully worked out plan to substitute G-4 Philfuels for gasoline on the block test. His suggestion showed how the investment of $32,900 required for equipment to utilize this method, would be repaid in about 12½ months. The net fuel saving per motor tested was estimated to be 6.49 cents. In testing 1,600 motors per



day the saving would amount to $103.90, or $2,597.50 for a 25-day month. Tests on approximately 507,200 motors would repay the installation cost.

In announcing the award for this suggestion the judges said: "Mr. Flynn, in making this study, left nothing for the general committee to investigate. He developed all of the costs, capital investment and savings, as compared to our present method of operation. In addition to this complete report, the General Committee on Awards had this report checked by engineers and the Works Manager's Committee at the Central Office in Detroit. They found that all of the claims which Mr. Flynn had made were accurate and practical.

"It is very gratifying to the management that the outstanding feature of the majority of the suggestions was that considerable thought had been given to them before they were submitted."

Oakland's "War on Waste," as itemized in the table, cost approximately $16,000. From evidence of the waste prevention spirit shown by the volunteers, this cost is small compared with the tangible and intangible returns that will accrue from the war. According to Gordon Lefebvre, vice-president of the company and general chairman of the War on Waste Committee, about 35 per cent of the 3,558 suggestions received will effect a projected saving of about $542,000, while a like amount may be expected from the balance of the suggestions which were set aside for further investigation by the permanent committee. When there are added the intangible values accruing from the entire care and pains taken throughout the plant during the campaign to flog the Demon Waste, a huge sum results, so large as to be almost beyond belief.

Mr. Lefebvre, in summing up the campaign's results said, "Mr. Sloan, president of General Motors, has been very anxious to get a complete report on the results of the campaign. It's a 'grand-and-glorious feeling' to report to him that our 'volunteers' came through to the extent of more than a million dollars."

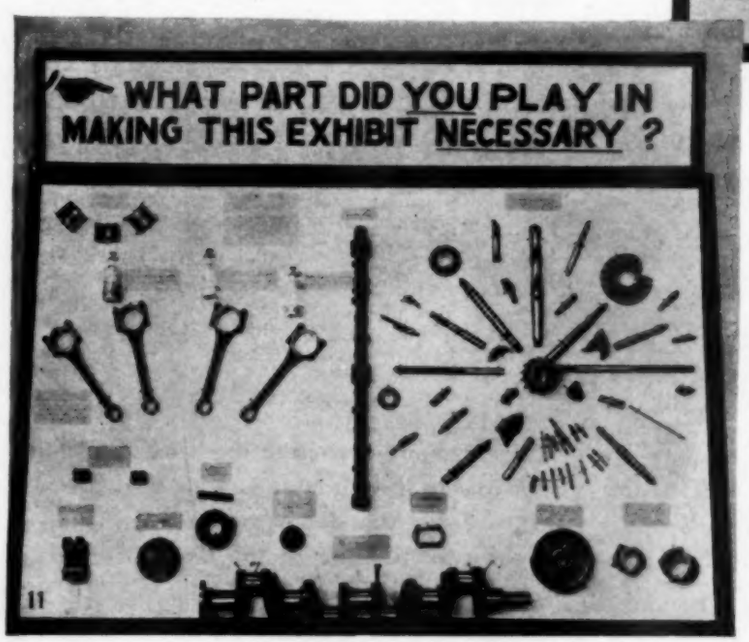


Fig. 9—A well-laid-out exhibit was prepared by the sheet metal department. Labels on each piece explained the cause and the cure of the waste

Fig. 10—Another board furnished some striking examples of waste in the use of tools. Costs of the loss or damage were itemized wherever possible.

Fig. 11—Boards such as this one carried exhibits of spoiled car parts, loss through changes of design without notification to production divisions, and similar examples of avoidable waste

EXECUTIVE · FORUM

What Should We Teach Apprentices?

"THERE'S a lot of talk about apprentices these days, Mr. Holland," remarked Jim Mahoney of the pump shop at lunch one day. "Lord knows we need more skilled men in the shop, but how are we going to get them and how can we train them?"

"Most people seem to want them already trained, Jim. They want skilled men that some one else has trained, or else they want boys who won't make mistakes. It isn't easy to get either."

"I'm willing enough to train them, Bill, but I don't know how. Of course, I ought to know, but the fact is I don't. If I put them in the shop the men think they are a nuisance, and the foremen are too busy to bother with 'em."

"What about special instructors, Mr. Holland? Are they worth while, or not?" It was George Gentry of the tool shop, this time.

"If your foremen can't teach the boys—and few of them have time these days—there must be some kind of an instructor, George. If you get a good one, it's well worth while. But a really good one must know *boys* as well as machines. A man who can teach boys shop work and make it so interesting that they like it, is worth more than you can probably pay him."

"Seems to me anyone who can show a boy how a job is done on a machine, and see that he does it, is about all you need. You can't give 'em a college course, even if you wanted to, and why should you?"

"Opinions differ widely on that, George. Some of the best known plants believe it pays to have good instructors and to teach the boys a lot of other things in addition to how to run the machines."

"Just how do they figure that pays, Mr. Holland?" asked Mahoney.

"In several ways, Jim. First, it gives you a number of young men to draw from for foremen after they've had enough experience on top of the training. Next, it gives a crew of more reliable men in the shop, men who know the 'why' of a lot of things that are of real value.'

"Such as, Bill?" asked Jim.

"Such as knowing enough not to put an eighteen-inch wrench on a three-eighths nut, twisting off the bolt and balling up the whole works, as one of my men did the other day, Jim," spoke up Gentry. "Such as knowing enough not to lift on the short end of the lever, or to try to clamp work the same way. I've seen many cases where teaching boys the foundation principles of mechanics not only made them more valuable, but also gave them an added interest in the job. And we all know that interest in the job helps a lot. It's one of the things we often overlook."

"Maybe we don't overlook it so much as we pass it up from necessity," countered Jim. "How can you take the time nowadays to run a shop school on the side, especially in the smaller plant? If a boy learns to handle a machine, what more do you want him to know?"

"A lot, Jim," interposed Holland. "Besides the mechanics that George mentioned, many plants have discovered that it's important to teach the boys shop mathematics, how to read blueprints, how to make drawings, a little elementary physics, something about the simple engineering principles back of the products they are making, and I'd even go as far as to check up on their spelling and manner of expression. Ambitious boys usually develop into foremen and superintendents, and should know how to write understandable reports."

"If we started such a program in the pump works the boosters of apprentice training would never be satisfied until we added all the frills of a complete higher education," objected Jim.

"Well, Jim," said Gentry, "Bill didn't finish his story. In my opinion, there are a lot of other subjects well worth teaching to apprentice boys, and I wish I'd had the chance to study them when I went through the mill."

"Jot them down and send me the list, George. I might get interested, after all."

Executives are invited to discuss the problem involved in the foregoing case. They are also urged to use this department to air their own problems. A letter to the Executive Forum Editor is all that is needed.

DISCUSSION

A Novel Reward for Shop Improvements

In the presentation of this topic, Mr. Jeffrey is quoted as paying a flat rate for all suggestions. This policy is wrong. He might as well expect to bring down moose with bird shot. The failure of many suggestion plans can be charged to similar views.

The best plan I have heard of was described recently at a meeting in our shop. Briefly, it includes paying the suggester the full amount of the net savings resulting from his suggestion during a definite period—two months, six months, or a year—depending on the probable life of the idea. The amount, when it is of sufficient size, is paid in two installments if the man remains at work for the company.

One incident was related of a man receiving $1600 under this plan. Needless to say, the mental activity in this particular organization immediately went into high gear. The chief reason why basebell, treasury balance, and other pools are so popular and well patronized is, as Mr. Holland says, "the lure of possible profits." Likewise, the lure of a possible "killing" as mentioned in the above incident, would, as Mr. Holland further says, "stir up ideas."

—N. J. BOWNE, *Cost Accountant, The DeLaval Separator Company.*

Cash or Royalty on Machines?

Since new machines are bought because they lower the cost of production, the resulting savings pay for the installation. If the investment is paid out in one sum, a large expenditure of cash is involved before any benefit is received from the machine. A better method is to make a down payment, agreed upon by both parties, followed at regular intervals by payments of a fixed per cent of the savings over a definite period, or preferably for a certain number of finished parts produced. The purchaser would thus amortize his investment without a large capital outlay and the designer would be provided with a steady income over the period agreed upon.

As a matter of protection, a minimum price should be set on the machine so that the designer gets a fair price for his work and the buyer pays a reasonable amount for the benefits gained. Payments made above this minimum amount represent the earnings or savings of the equipment. By making the payments on a royalty basis, both sides gain when the designer has made a successful machine, and, likewise, both lose when the machine does not live up to anticipations. By being willing to shoulder his share of the losses on the poorer machines the designer is in a better position to demand a greater share of the earnings of the successful machines.

—L. O. BROWN, *Toolroom Foreman Holcomb & Hoke Manufacturing Company.*

Reducing the Scrap Heap

One cause of a huge scrap heap is the hiring of men who are not what they claim to be. Many men hire out as machinists, when they are little more than machine operators. A day or two will suffice to show them up, but meanwhile they may have done irreparable damage to expensive machines, such as overloading drill presses or milling machines. The damage is often scarcely noticeable and sometimes is in the nature of a strain.

A milling machine, forced to make a deeper cut than that for which it was designed, will undergo a strain, especially if the cutter is somewhat dull. A drill-press will be damaged by the use of an oversized drill which forces the table and fixtures down. Afterwards the machine cannot be relied upon to do accurate work. I have found it necessary, on occasions, to overhaul machines damaged in this way by putting in new arbors and new bearings all around.

—G. C. MARTINSEN.

One method which will prove effective in reducing the scrap heap is to provide the worker with better training. A large number of workmen have had little schooling, have forgotten much that they learned, and do not know how to study and master a problem. Therefore, the worker looks to the foreman to obtain instructions required for his work, and for leadership in reducing spoilage and waste.

Shop executives are apt to believe that instruction consists merely in ordering workmen to perform their tasks. But this is not instruction. It is necessary to teach men how to keep their machines in good order and how to plan their work. Many workmen are following certain occupations not because they have any aptitude in these trades, but because they just happened to secure a job in this kind of work. They never will become proficient nor be able to help in reducing the scrap pile, unless foremen enable them to obtain an understanding of the machines they operate, of the tools they work with, and of the work they are doing. —G. H. GUNN.

Discouraging Rush Orders

A few weeks ago I was called into our general manager's office to explain the delayed delivery of a certain number of rush orders. This occasion offered the opportunity to discuss the whole matter freely. We found that many of our customers would write "Delivery at once," or "Delivery in the shortest possible time," and similar notations, on all their orders. Often we receive orders of this kind over the telephone. In most cases these delivery requirements had been accepted by the office, or even by the manager himself, without questioning the production manager as to whether such delivery dates could be met without extra cost to the shop.

As a result of the conference, it has been decided that, in future, we will quote prices only

against a reasonable, specified delivery date. If earlier deliveries are demanded, higher prices will be asked. We think that our customers will recognize the justice of the step and will instruct their purchasing departments accordingly. Of course, there are circumstances where a demand for rush delivery is justifiable, but in these cases higher prices are likewise justifiable.

The problem of machine tool reserve has been solved in our plant by operating the reserve equipment in conjunction with the regular machine tool equipment. A little longer time than is required is allowed on each order put through. In this way, the deficiency of the reserve machine tools, which are naturally of an older type, does not react against the regular production program.

—FRANZ BERMANN, *Supt., Locomotive Factory, Austrian Hungarian Licensed Railway, Vienna.*

Handicapping Salesmen with Wrong Information

As one who buys many electric motors for attachment to machine tools, I can vouch for the fact that the actual bolt hole spacing on the base of the motors is not always in accordance with the preliminary blueprint furnished. A salesman has every right to be angered when he discovers that prints furnished to him by the engineering department of his plant, and used by a customer to locate bolt holes for the attachment of motors to machines, have been incorrect and have caused the customer a loss.

To meet competition and consequent low selling prices, most electric motors must be built in quantities and to close limits. Manufacturers of motors stress the greater efficiency made possible by using ball or roller bearings, permitting a decreased air gap which, of course, calls for very accurate machining; and yet these manufacturers send out printed drawings with their estimates which state that the dimensions will be confirmed on receipt of order.

Surely, with such accurate methods used in machining and assembling the motor, they could at least give the bolt hole centers within limits close enough for all practical purposes. This, however, is not done, and no manufacturer building motors into his product would think it safe to machine the motor baseplate from even the final drawing of the motor. He waits until the motor arrives and measures the bolt hole distances and shaft centers for himself, rather than run the risk of making a mistake.

The question of standardization introduced in the presentation of the topic is one of great difficulty. For ordinary use, spread feet mean greater steadiness and hence the greater the distance between the bolt holes the better. But where the motor is intended for use as a direct-coupled component on some machine, the fact that the feet on the motor base are close together will sometimes be enough to insure the specification of a certain make of motor.

—C. NORMAN FLETCHER, *Cheshire, England.*

Rewards for Suggestions

The fact that suggestion boxes have held a place in so many plants for a considerable number of years, proves that they are of definite help in running a business. Two firms having suggestion boxes have come to my notice. In one case the boxes seemed to have been completely forgotten by the heads of the firm, and all that the men placed in them was their waste paper. But then, this was not a very successful business in any of its branches.

The other firm was just as successful with its boxes as in any other part of its operations, the reason being that every suggestion was given careful attention. If even the smallest saving could be made by using a suggestion, it was paid for, and all ideas were rewarded according to their merits. It may be of interest to include two examples of suggestions.

One of the men noticed that there were no holes in the soap dishes in the washrooms. They were continually filled with water and there was consequently a waste of soap. Since the firm supplied the soap, they had holes drilled in the dishes, and paid the man for the suggestion.

A man in the plating department called attention to the loss in output to shutting off the current on the plating tanks during lunch hour. His suggestion brought more profit to his firm for the extra hour output per day gained, and of course, he was paid for it.

Small things like these are apt to be overlooked. However, they are sources of worthwhile savings. A man who has an important suggestion to make would rather keep it to himself if he thought that he was not going to receive just treatment. But he will have confidence and come forth with his ideas when a suggestion box scheme is operated with fairness.

—L. E. MARKEY, *London, England.*

Suggestion systems have been employed for a number of years, and probably more plans have been tried and thrown out than have been continued in successful operation. The reason behind most failures has probably been a vague or an unfair method of making awards. The success of a suggestion system depends upon the suggestions received which display careful thought. Men who submit such ideas are not likely to respond enthusiastically to the appeal unless they feel reasonably sure that they will receive just treatment and a fair reward.

I have seen all sorts of reward methods employed, ranging from flat payments for all suggestions, through percentage payments based on an estimate of probable value, to what appears to me to be the ideal method, namely, one wherein the actual returns from the application of the suggestion are recorded and a percentage reward is given to the applicant, based on such records. This plan appears to be highly desirable and serves a double purpose, as it keeps alive the fact that consistent thinking in the company's interest will return a definite and proportionate reward.

—D. C. WRIGHT.

Executive Considerations in Tool Design and Production

By M. H. FLYNN

Factory Manager, Allen Manufacturing Company

This final part of the article shows how consultation with the foreman and machine operator will often save redesigning of a tool and result in economy

IF ALL the things that have been described, or suggested, are done, the actual work of tool designing has been greatly simplified and the designer can concentrate his attention on the designing work. To do this work efficiently, the designer must have had certain training and experience. He must know how to make mechanical drawings, and he will find his work easier if he can make good freehand sketches. If he has not worked as a skilled machinist or toolmaker, he must understand their work and know how to set up and operate the machine tools and production machinery upon which the tools are to be made and used. He will find inventive ability an asset, although many tool designers do not possess this trait. He should know mathematics well enough to be able to solve intricate problems in trigonometry, cams, and gearing.

A knowledge, by experience or study, of the work and limitations of the piece worker or the operator who will work with the tools is valuable. Too little thought and attention is given by tool designers to the operator who must earn his living with the tools the designer produces. A designer will turn out much better tools if he understands thoroughly the operator's point of view and considers carefully the operator's suggestions. A consultation with the operator when an old tool is to be redesigned or replaced will often result in the production of a more efficient tool and a corresponding reduction in labor cost.

Conclusion of the article.

A designer must approach tool designing in a different manner than he would machine designing. A machine tool or machine represents a considerable investment. The design must be thought out carefully, studied, and reworked until the machine is as nearly perfect as the designer can make it. One machine will hold the designer's attention for a long period, and he is usually allowed time enough to do a thorough job.

The tool designer, on the other hand, must produce quick results. When a decision has been made to put a mechanism into production, the work must be done with despatch. The tool designer, therefore, must be equipped to produce good designs at the first attempt, in order that very little redesigning will be necessary. In fact, ordinary tools such as drill jigs, milling fixtures, and sheet-metal tools cannot be given much time on the drafting board. A few of these problems are hard to solve, but most of them are simple. Such tools, when efficiently designed and built, represent comparatively small sums. The designing, therefore, must not be costly in proportion.

The designer must look upon the tools for a mechanism as a whole and know which may be given extra time on the drafting board. He must know that expensive production machines need exceptionally good tools to pay dividends; that some tools have been so highly developed that he may safely use old designs; and finally, that instead of spending too much time trying to produce an exceptional design for new types of

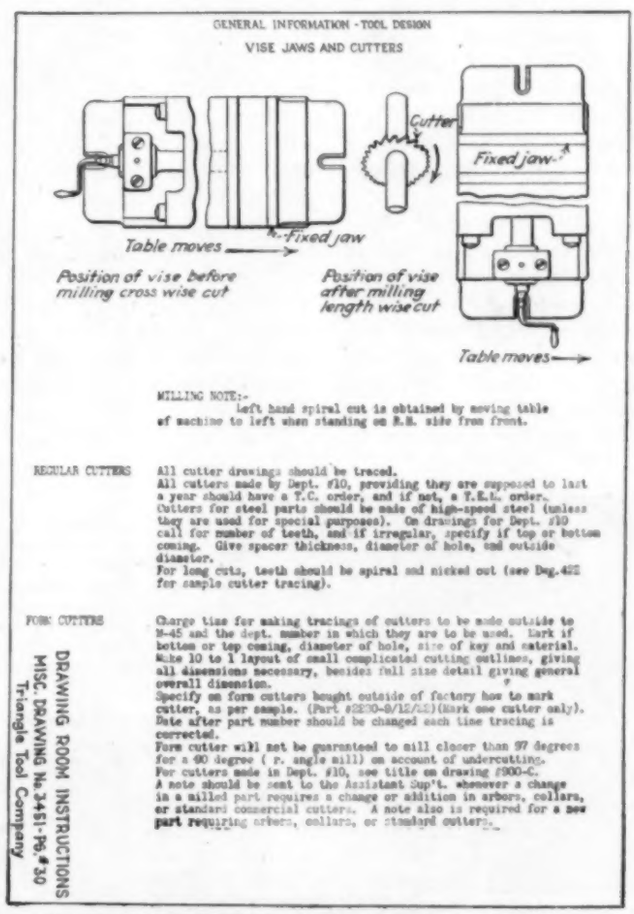

GENERAL INFORMATION - TOOL DESIGN
VISE JAWS AND CUTTERS
Cutter
Fixed jaw
Table moves
Fixed jaw
Position of vise before milling cross wise cut
Position of vise after milling length wise cut
Table moves
MILLING NOTE:-
Left hand spiral cut is obtained by moving table of machine to left when standing on R.H. side from front.
REGULAR CUTTERS
All cutter drawings should be traced.
All cutters made by Dept. #10, providing they are supposed to last a year should have a T.C. order, and if not, a T.E.L. order.
Cutters for steel parts should be made of high-speed steel (unless they are used for special purposes). On drawings for Dept. #10 call for number of teeth, and if irregular, specify if top or bottom coming. Give spacer thickness, diameter of hole, and outside diameter.
For long cuts, teeth should be spiral and nicked cut (see Dwg.422 for sample cutter tracing).
FORM CUTTERS
Charge time for making tracings of cutters to be made outside to M-45 and the dept. number in which they are to be used. Mark if bottom or top coming, diameter of hole, size of key and material.
Make 10 to 1 layout of small complicated cutting outlines, giving all dimensions necessary, besides full size detail giving general overall dimension.
Specify on form cutters bought outside of factory how to mark cutter, as per sample. (Part #2230-0/12/22)(Mark one cutter only).
Date after part number should be changed each time tracing is corrected.
Form cutter will not be guaranteed to mill closer than 97 degrees for a 90 degree (r. angle mill) on account of undercutting.
For cutters made in Dept. #10, see title on drawing #900-C.
A note should be sent to the Assistant Sup't. whenever a change in a milled part requires a change or addition in arbors, collars, or standard commercial cutters. A note also is required for a new part requiring arbors, collars, or standard cutters.
DRAWING ROOM INSTRUCTIONS
MISC. DRAWING No. 3451-P6 #30
Triangle Tool Company

Fig. 1—A sheet from the "Book of Standard Instructions" issued to each designer by one company. In the book is collected all information concerning the designing of the types of tools used by the company, together with necessary dimensions of the various production machines, to eliminate duplication of work. This book has helped materially in developing a series of excellent tool-types which make possible speedy design of new tools

operations, the most simple tools must be made, since later development will produce the best type for the operation.

He must not consider, as some draftsmen do, his work as the end in view. In designing machines, the design must be the most important thing, because a machine or a particular design may be used or reproduced for years. With tools, the most desired result is the production of parts. Any experimental tools are incidental and will be discarded after short use.

After an operation has run successfully for a time and production requirements demand greater output, higher quality, or lower cost, the tool designer has a problem more nearly approaching that of machine designing. A careful study of the operations, the experiences, and the opinions of all concerned in the production work or affected by the tool should be made. This study will help the designer to produce a good tool, and will avoid some of the expense of developing a tool by building and testing successive designs.

When producing a set of tools for a mechanism, a good designer will have a general plan for the whole lot, and will make all designs in accordance with this plan. While he is writing the operation and tool lists, the plan will develop. The type of tool for each operation will be considered and the general design established. The location of registration points on the different parts and their relation to one another will be determined. A revision of allowances and tolerances, as shown by the engineer on the part drawings will be proposed if advisable. Changes in design of the parts will be suggested to the engineer if such changes can be made safely, and if they will decrease tool or manufacturing cost. If a designer studies his work carefully, he will be able to make designs with facility.

Since many finished tools are worth only small sums, including the designer's work, the tool drawing should not be too costly. A few years ago, tools were designed on drawing paper, then traced on tracing cloth to obtain blueprints. Sometimes the heavy paper drawing was shellacked and used in the shop, no tracing being made. Designs and details are now drawn in pencil on transparent paper, the blueprints being made directly from the pencil drawing. This method has the advantage of being economical, and it allows the designer to retain his original drawing, as well as to make minor changes in the design which may result later from the experience in the use of the tool.

A good way to start a design is to make a drawing of the part to be machined as it will be put into the tool, with the operation to be performed shown on it. Then the cutting tool may be drawn in place, its starting and stopping positions being indicated. Next, the part of the machine which will support the tool being designed should be shown. There should be two or more views of the tool, or as many as are needed to show possible interferences and to illustrate fully the complete design. If the tool is to be used on a machine with which the designer is not familiar, he will, of course, study the machine and make a record of the work-holding methods and the movements that will control the tool. In well-organized drafting rooms, these records are kept on file and are given to the designer with the job, but if the designer does not know the machine, he must study it and check the accuracy of the layout if he is to do a good job.

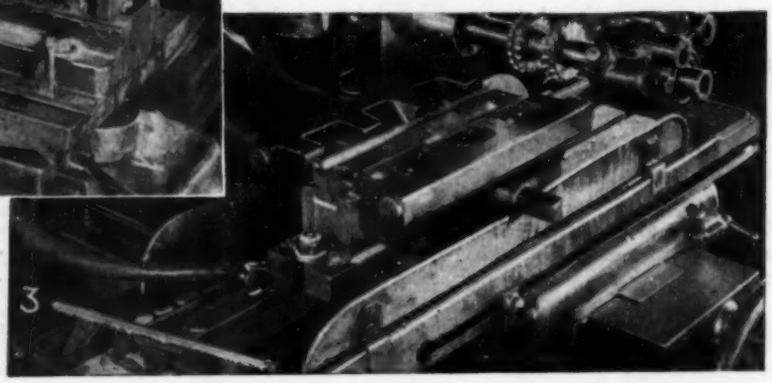
When a design has been finished, it may be detailed at once. If it is a new design, a new type of tool or operation, or a complicated design, a good plan, if time can be allowed, is to put it aside for a few days and do other work before drawing the details. When it is picked up again, ideas may have ripened that will greatly improve the tool. These ideas may be worked into the design before detailing, thus producing a much better tool at a lower cost than if the detailing had been done at once and then discarded for a later and better design.

If the tool is a small one, and the drafting room rules will not be violated, the designs and details may be put upon one sheet. The sheet selected ought to be of standard size, large enough so that the details will not be crowded too closely together. Each piece that is not a standard article should be dimensioned in a separate detail. A list of the standard pieces should appear on the drawing. A drawing such as this gives the toolmaker a complete record of the whole job without danger that parts of the record may be lost. If the tool work is departmentalized, blueprints of the whole tool may be distributed to those who need them.

If the tool is large, designs may cover several sheets of

Fig. 2—A recent development in tool design; a duplex milling machine equipped with quick-operating fixtures. One fixture is loaded while work is being done in the other. Work is held in the fixture by spring-pressed equalizing straps. A hand-operated cam locks two pieces into the fixture

Fig. 3—Another recent development in tool design. A rough-milling cut being taken on two pieces held in a fixture by compensating fingers that press against the rough surfaces of the work. The pressure then is transmitted through a wax compound when the drawbolt is tightened. In this way, one bolt fastens both pieces, making possible a quick change of work



paper and the details several more. In this case, the details should be arranged to suit the toolmaking departments.

Designs should be completed, studied, and approved before details are made and before patterns are made or any metal is cut. Designers often start patterns and order materials before designs have been fully settled. Many expensive patterns, and sometimes castings, have been thrown away because tools could not be finished according to the original plan.

If the work must be done in a great hurry, pattern sketches and lists of materials may be made before detailing starts so that castings and materials may get to the tool room with the drawings. Detailing, tracing, pattern making and tool making are mainly routine work requiring little inventive or creative ability. All of this work may be scheduled, if designs have been carefully made, studied, and approved.

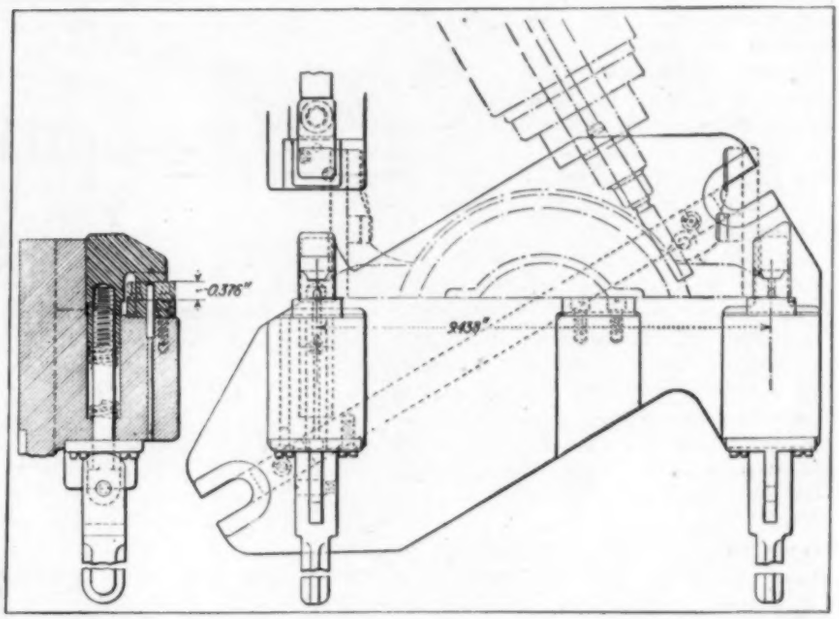


Fig. 4—A tool-drawing with the part and the cutting tool as they will stand in relation to the fixture when the operation is being performed. It is sometimes necessary to put these details on tool drawings to avoid interference, or to show the method of setting the fixture and the tool

The approval of designs requires careful attention. Everyone interested in a tool should be consulted before the design is considered finished. This includes engineers, toolmaker, producer, and the foreman who will use the tool. If the signatures of these men are written in approval on a drawing of the tool, they will have had a chance to study and criticise the design and to register a protest if the design, for any reason, does not suit them. Many good tools have been scrapped or severely criticised while used at a loss, because the designer did not take into account something that was common knowledge in the production department. This knowledge will be discussed with the designer if the foreman must write his approval of the design.

If a designer will put himself in the place of the foreman or operator and will design tools that he himself could use, his tools and his reputation will both be benefited. An easy way to do this is to get the operator's opinion of each tool after it has been in use for a time. A designer who has not followed this practice, will, if he will ask questions with an open mind, be surprised at the results.

Some tools have been so highly standardized that parts, such as punch and dieholders, and drill bushings can be purchased ready to use. A designer should make use of standard equipment of this kind as far as it is economical to do so. For tools which have not been standardized he can develop a simple type that is best suited for his product and that may be easily duplicated when worn out. By making changes and improvements in successive designs he will eventually arrive at the type that may be considered standard for that work.

During the progress toward standardization in tool designs, the designer should consult the many excellent studies of various kinds of tools that have been published for the instruction of designers. Reports of practical tests of new ideas and methods appear regularly in the trade papers. Each designer will do well to develop his own style as much as he can, but he should study the work of others and make use of the knowledge that has been published. While doing this, he should discriminate carefully in applying this knowledge to his own work. The use of standard designs and parts is sometimes carried to such an extreme that the cost of production is affected. For instance, if all of the drilling in a certain mechanism had to be done in one type of jig, the cost of the drilling operations might be much greater than if the right type of jig were designed for each piece. While studying parts before designing tools, this point needs attention.

Another point that deserves careful study before designs are made is the time that will be required to load and unload the tool as compared with the actual cutting time. An expensive machine should be made to work as large a percentage of the time as possible. If the tools are so designed that the machine is idle for a considerable time during each cycle while the operator is loading the tools, the machine-hour cost will be high. Careful selection of the type of machine and study of the design of the tool will lower the cost of the operation.

After a set of tools has been in use for a time, and especially when duplicate tools or replacements are needed to increase production, a designer has an excellent opportunity to cut costs by making a study of handling time and reducing it to a minimum.

Production tools and special machinery are used to reduce the cost or to improve the quality of a manufactured article. Their cost is a burden on the business, for, unlike standard machine tools, they cannot be sold when they are no longer needed. For this reason, they should be built at the lowest possible cost. No greater degree of accuracy or finish should be employed in their design or construction than is actually required to produce the desired results.

The results for which the tool designer should work are: simplicity of design; low construction cost; ease of operation; accuracy, stability, and efficiency of work-holding devices; and economy of machine and operator's time to produce maximum quality and quantity at min-

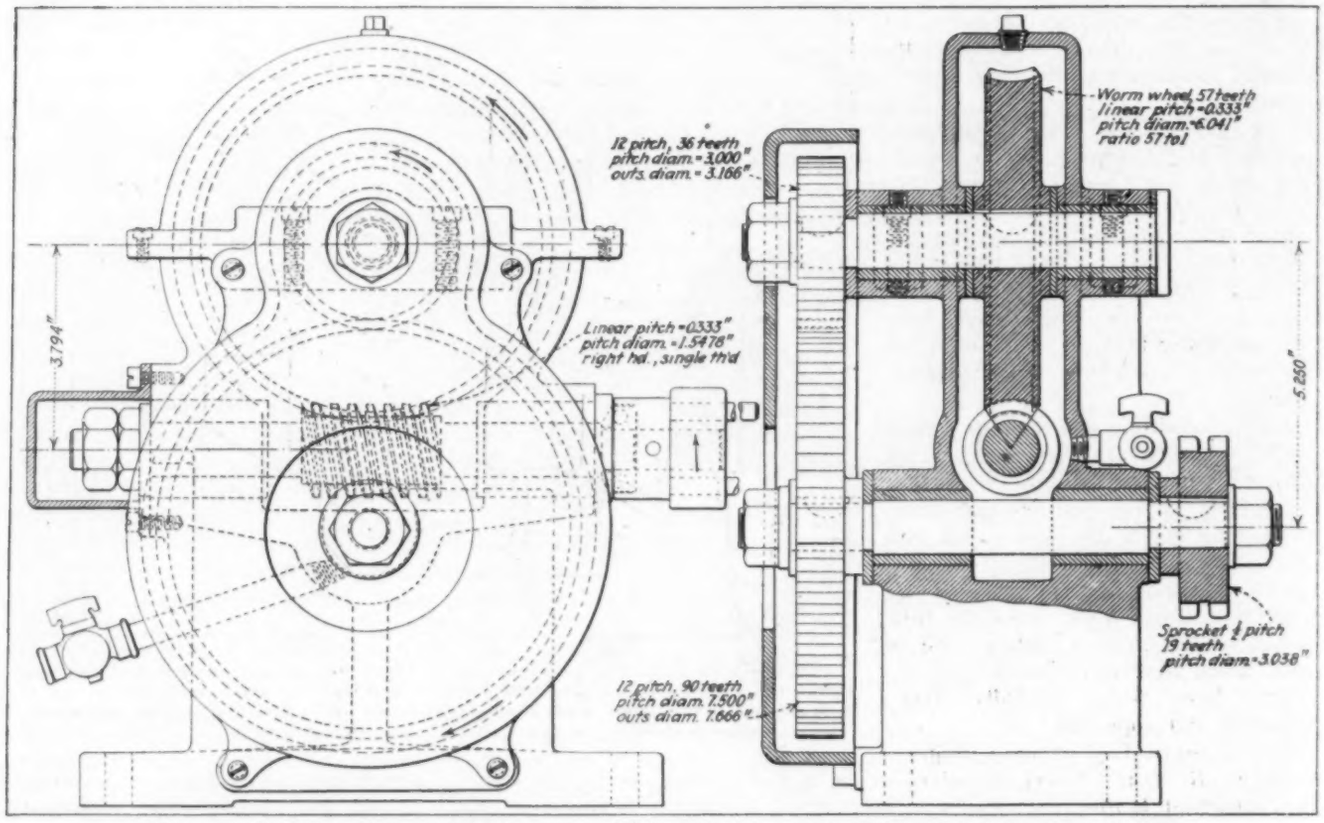


Fig. 5—A difficult problem in reducing gears, which is similar to many that the tool designer must solve

imum cost. Constant attention will produce results, and it is with this idea in mind that the tool designer should work. There are many details which have been treated in various technical works that are available to the designer, and which will repay many times the time he spends consulting them. Attention to the little things is the only method of producing a completed tool that will give maximum satisfaction in the shop, and the experiences of others will often aid materially in achieving this result.

OTHER parts of the article which have already appeared were published as follows in Vol. 70: page 649, page 731, page 889, page 965. Another phase of this same subject is covered in two articles by Prof. Joseph W. Roe, entitled "Principles of Jig and Fixture Practice," which were published on pages 867 to 872 and 916 to 920, Vol. 69, of the American Machinist.

The Manufacture of Draftsmen's Scales

By Donald A. Hampson

IT IS probable that draftsmen and machinists alike have wondered how the lines and figures on draftsmen's scales were made so visible and permanent. The practice in one factory may be taken as an example. Graduations are cut and figures are stamped either on standard machines or on special ones built for this particular line of work.

In the plant under consideration a graduating machine of its own design is used in which the lines are cut on twelve scales at one loading. Twelve tools are held in the head, one for each scale. The scales are placed staggering in ⅛-inch steps which means that the work holder has to travel 13½ in. when graduating 12-in. scales, inasmuch as the tools are also spaced sidewise in ⅛-in. steps.

The forward, or cutting, stroke is powered by a weight and the length of the stroke is controlled by stops that give the lines the correct lengths for eighths, quarters, etc. A very accurate lead screw is, of course, necessary. The gears and stops are changed when scales for different purposes are to be divided. After being cut, the lines and figures are filled with charcoal and the scales are shellacked to make them permanent, though some scales are oiled and polished instead.

Practically all scales and rules of this class are made of boxwood. At least two years' of air drying is required before the wood is ready to be cut into boards which are sawed into strips that will afterward be given their triangular shape in a woodworking shaper. This machine has a vertical spindle carrying tools at its upper end, and running at 3,000 r.p.m., or more. The tools generally used are formed cutters such as are to be found in machine shops, but have six big teeth. Thus at 3,000 r.p.m., 18,000 cutting edges are presented to the work per minute. The scale blanks are passed along a guide at one side of the cutter and are finished completely on one surface at a pass—straight and with the finger grip cut in the center.

The wood used in making T-squares and triangles is usually maple and is machined with greater accuracy than attends most woodworking operations. Micrometers are used for measuring in some cases, but the ordinary practice is to use snap gages, where, say, eight pieces of ⅛-in. thickness must go, or not go, in a 1-in. gage.

An
Automatic Switch
That Provides
Two Spindle Speeds

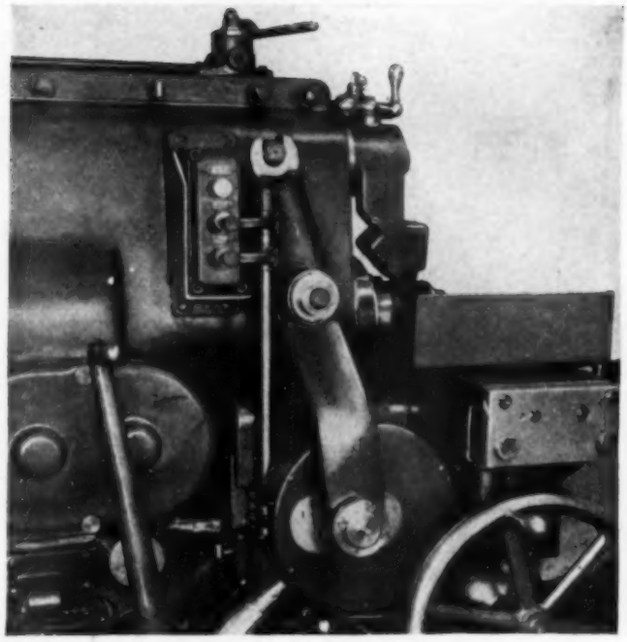
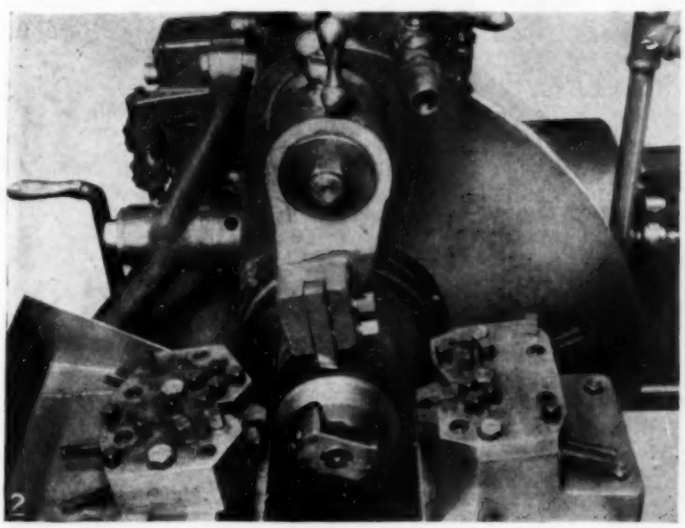


Fig. 1—Automatic speed changes are attained by movement of a vertical shaft that is cam-operated and arranged with two fingers to control the switch box

SPEED changes between roughing and finishing cuts when both are made at one setting usually cause time losses, particularly when the changes are made by an operator attending more than one machine. The accompanying illustrations show one method of handling such cases by the use of an automatic switch connected directly to the machine. In Fig. 1 is shown the machining of universal joint flange yokes in a Sundstrand Stub lathe. The operation includes the roughing and finishing of the outside diameter and sides of the flange, and the body diameters at each side of the flange. The front tool slide approaches the work rapidly, slowing down to the cutting speed and feed when the tools reach the work. After completing the roughing cut, the tool slide returns to the starting position, when the rear tool block comes into action and the finishing cut is taken. The over-arm attachment, operated by a cam and lever from the front of the machine, is arranged to finish turn the outside diameter at the same time the other finishing tools are in use.

In order to obtain the roughing and finishing speeds, which are 93 and 140 r.p.m. respectively, the machine is driven by a two-speed motor. The automatic control of the motor is effected by a cam-operated push button as illustrated in Fig. 2. The auxiliary unit is attached at the front of the machine and consists principally of a vertical shaft, a cam, and a switch box. At the lower end of the shaft a finger engages a face cam driven from the machine. On the upper end of the shaft are located two switch fingers that operate the high and low-speed push buttons. In action, the cam is synchronized with the cross-slide of the machine, and the cycle is fully automatic. The only duties required of the operator are loading, unloading and stopping the machine as needed.

Another lathe was arranged with the same automatic devices for the turning and threading of bar work as illustrated in Fig. 3. In this case, however, the vertical shaft is operated by an auxiliary unit located at the rear of the machine and driven from the speed shaft. The higher speed is used for turning, facing, and necking, while the slower speed is used for threading, for which a self-opening diehead attached to the tailstock is used.



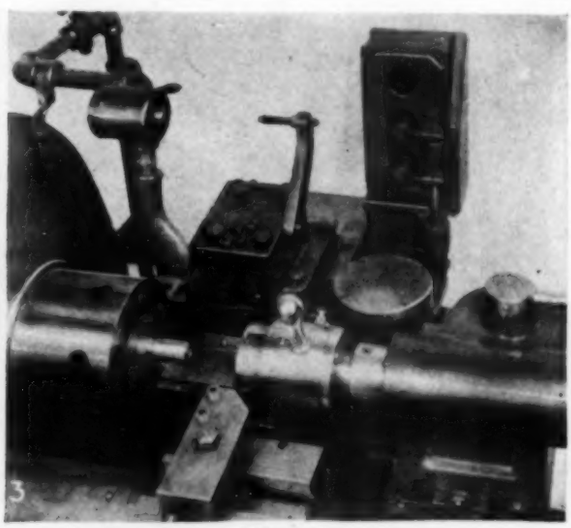
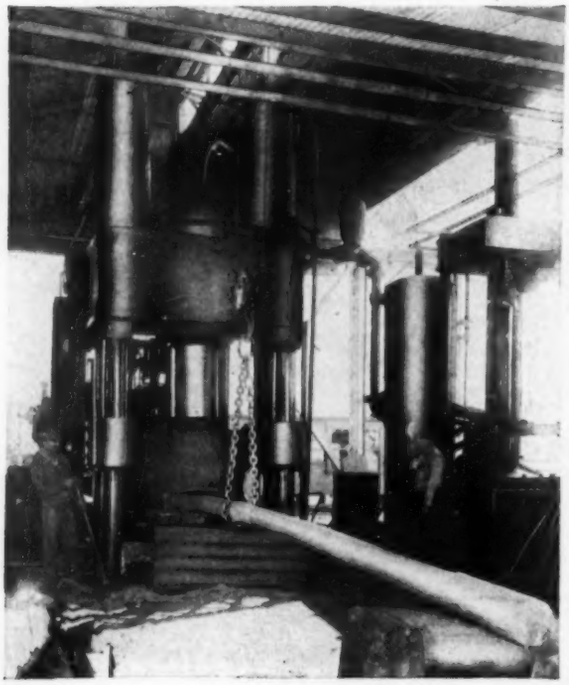


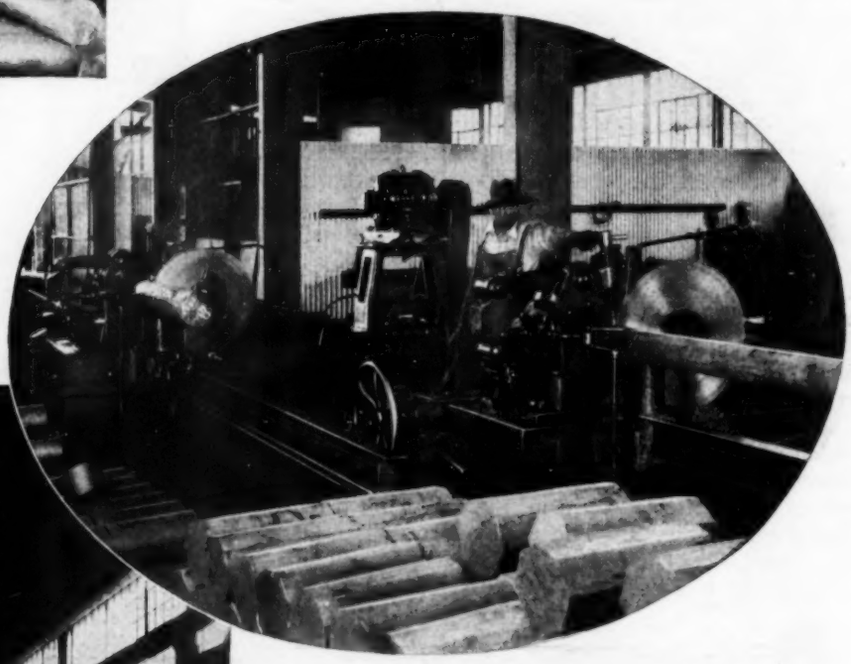
Fig. 2—Turning a universal-joint flange yoke in a machine equipped with an auxiliary device that automatically changes the roughing and finishing speeds. Fig. 3—A high speed for turning and a lower speed for threading are obtained automatically by a two-speed motor and an auxiliary switch arm

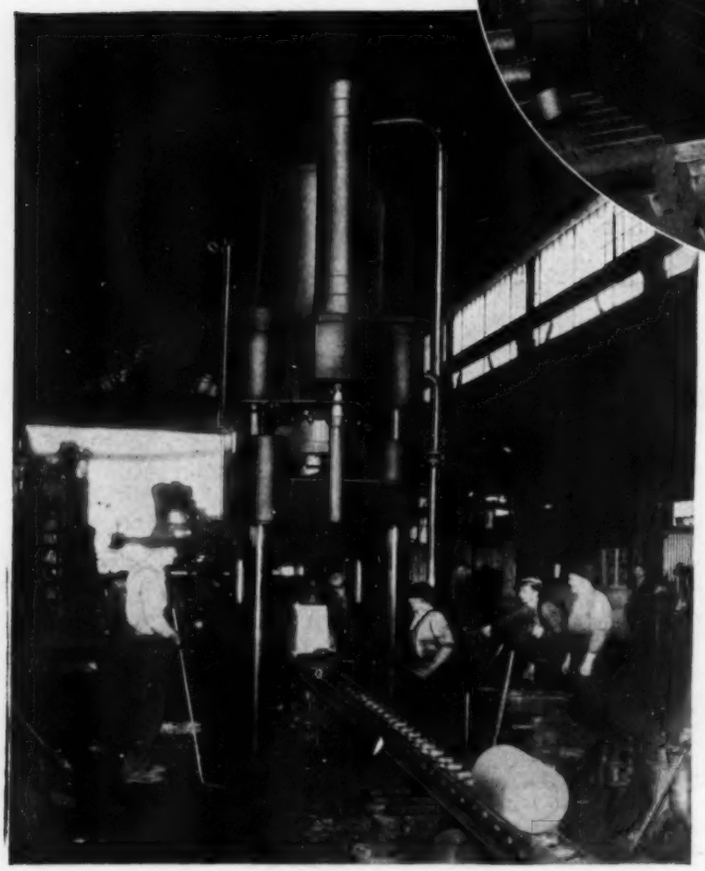
Forging Joints fo



Tool joints for oil pipe ranging from 2 to 5 in. in diameter are made of S.A.E., 3,135 steel, and those from 6 to 8 in. diameter of S.A.E. 1,035 steel. Ingots are made by the open-hearth and electric-furnace processes into sections approximately 24 in. square. After a preliminary reduction, the bloom has all surface imperfections chipped out, so that there will be no flaws in the finished product. The bloom is then reheated and the final reduction is made in a 1,000-ton press as shown. One of the ingots may be seen in front of the press

Photographs by courtesy of the Ensco Derrick & Equipment Company, Los Angeles, Calif.

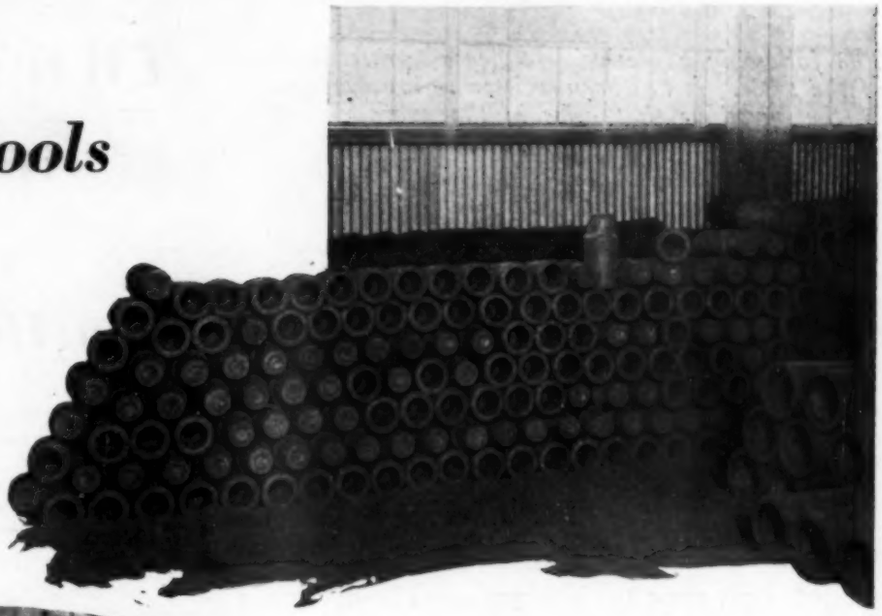




After the bar is straightened, it is sawn into suitable lengths for forging. The bar is aligned by two V-blocks on a carriage that travels horizontally on an I-beam track. It is held by a clamp attached to the outer section of the carriage and by a second clamp mounted on the base of the machine adjacent to the end that is to be cut

The short billets are heated in a 65-ft. continuous-type furnace to a temperature of 2,350 deg. F. prior to being forged to desired shape. The illustration shows the 750-ton steam-hydraulic forging press piercing and drawing a tool joint. A section of roller conveyor is positioned at the front of the press, to transport the finished forgings to a cooling rack

...ts for Oil-Well Tools



A number of extruded forgings ready for machining. The nickel-steel forgings are annealed prior to being machined, remaining at the proper annealing temperature for two hours after which they are allowed to cool to approximately 700 deg. F. before being removed from the furnace to a cooling rack. The carbon-steel forgings, however, can be machined without an annealing treatment

Tool joints are subjected to a heat-treatment after machining which consists of heating the work thoroughly and uniformly in a furnace. This is followed by an oil quench. The joints are allowed to remain in the bath until they have reached the temperature of the oil, after which they are removed and drawn at a temperature of 1,000 deg. F. The carbon steel joints are given the same treatment, although the drawing temperature is held at 550 deg. F., followed by an air cooling

After being heat-treated, another thorough inspection is made of each joint. Here is shown an operator inspecting the threads of the box half of a joint. At the left is shown a hardness testing machine equipped with a V-block support on which the work rests

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been arranged

Games at the Noon Hour

"I DIDN'T see you on the train last night, Al. Did you miss it?"

"No," replied his foreman friend, "I went over to Alta yesterday and came home on the bus."

"Well," said Ed, as Al paused, "is that the end of the story?"

"No, I was just thinking how I could describe what I saw, and the impression it made on me without having it sound silly, I went over there to watch men play."

"That describes it to me, Al. I figured that those people couldn't do all the things you have told me they did, and work too, but don't let me spoil the story."

"Maybe you'd be surprised at the amount of work they get out and the little scrap they have. I thought we had a good shop, and I know Williams is up-to-date, or he wouldn't send us around like he does, but somehow our organization seems to be dragging lately, and I feel dissatisfied with myself every time I visit another plant."

"I know how you feel, Al; the wife says I always find fault with her housekeeping when we come back from a visit to her folks. But go on."

"Well, they have a personnel director over there who says that men are mostly grown up children, and that they need a change during the noon hour; something to rest them mentally and physically. So he started the men to pitching horseshoes, and then he started volley ball and hand ball, and now they are forming a league."

"We have a league already, Al, pinochle and craps furnish the competition."

"Even that is better than nothing, Ed, but it requires action, to take a man's mind off his work and wake him up."

"We don't need anything to keep our men's minds off their work. What we want is something to keep it on, and letting our men tire themselves out during the noon hour isn't going to do our schedule any good."

"You're wrong there, you old pessimist, the competition stimulates them mentally, and when they go back to work, it seems like a rest and they do more and better work, and I believe it. I talked to a couple of the boys I knew and they said the afternoon seemed much shorter now."

"Maybe it's because they don't start work until after the second whistle."

"Nothing to it, Ed. I am going to start a horseshoe tournament without saying anything to Williams, and then I'll ask him to fix up that place south of my office for volley ball. Then we'll challenge those workless wonders of yours to a game."

"I wish you luck, Al, but I am afraid it will be a flop."

Are games at noon beneficial? Do they relieve the monotony of repetition, or do they tire a man out so that he "loafs" in the afternoon? Are there any practical examples of where noon-hour games work out satisfactorily?

All foremen are urged to discuss these questions vital to their work; of course the disc

'S ROUND · TABLE

DISCUSSION OF EARLIER TOPICS

Radio in the Shop

I HAVE a natural tendency to avoid condemning any new innovation at first glance, for I am thoroughly appreciative of the fact that any new idea, no matter how hopeless it looks in the raw, can be made useful to some degree by the proper development and refinement of detail. However, when it comes to radio in the machine shop, I am inclined to agree with Ed that it will be a harmful disturbance. In addition to the noise of the machines, there is the fact that in any machine shop, no matter how highly repetitive the general run of work may be, there is always someone who has to figure and think deeply at any given time, and music is disconcerting to mental concentration.

Further, it has been discovered that rhythmic sounds influence the speed of work, in that the worker unconsciously keeps time with the sound. This was brought out in an investigation of the work of a machine operator on a press, whose production fell off unaccountably on certain days. It was found that this occurred when a larger and only occasionally operated machine on the other side of the wall was in operation, and whose operating beats were slower, and plainly audible.

If all the men were doing the same type of work and if the proper tempo could be ascertained and maintained, work might be speeded up, but this is obviously impractical with the varying tempo of a radio program.

—N. C. RICHARD.

*

Keeping Posted on New Tools

WHEN Williams gets a new job at double his present salary, at some other plant, or gets run over by a "bus," the firm will be looking for a new superintendent. If one of the foremen knows as much as Williams does about tools, production methods, and factory management, he will in all probability get the job. The other foremen will stick to the jobs they have, and meet trouble when it comes, and growl because they have not been promoted.

Every man who expects a better job should be prepared, as far as possible, to handle the job when he gets it, and that involves going to the man over him, not always for advice, but generally with a recommendation for the improvement of some operation or process.

—H. J. BURNHAM.

The Man Who Shows Interest

THE man who takes an interest in his surroundings is easy to distinguish from his fellow workmen, both by the quality of his work, and by his general conduct. He is the one who studies the "why and wherefore" of all he does, and who tries to excel in the quality of his work. He will not be content with the same job for years, but will work his way up toward the top of his profession. If lectures are given, this man will be found there; he will also be found at night school improving his knowlege. If he has a difficult job he will work all the harder until he has solved it, and as a rule he is a man of few words but many thoughts.

—H. MAPLETHORPE, *West Bromwich, England.*

INDUSTRY is showing a great interest in the university trained man. Obviously this is not because he comes to industry as a fully developed specialist, but rather because he has obtained a broad knowledge of many things. It is felt that this training gives him a good foundation for leadership and a capacity to appreciate the value of co-ordination between departments. So, when a shop man, who has probably been denied the same educational opportunities, through no fault of his own, shows initiative enough to recognize the value of this broader knowledge and to obtain it on his own time, I feel he should be encouraged.

Such interest should make a man more valuable, for modern industry demands close co-operation of its leaders, and no better basis for intelligent co-operation exists than a knowledge not only of our own job but the other fellow's. A man can hardly exercise full intelligence in considering his own work if he has no conception of its relationship to other work, or to the job as a whole. Of course, he might obtain a great deal of this information by selected reading, but we must admit that the direct method of approach has its advantages.

—JOHN T. THOMPSON.

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Committees for Definite Shop Problems

CONFERENCE committees can be used to good advantage in any shop where a large number of men are employed. They are an aid in helping solve the problem of co-operation between management and the employee.

We have a conference committee here that has been working successfully for a number of years, and just such problems as the one Al and Ed are discussing have been brought before it.

On our committee, the employees are elected by the men in the various departments, and the company appoints its representatives. It is better to have the men select their own representatives than to have them appointed. Most men appreciate the added responsibility which comes from being asked to serve on a shop committee, and it is found to work out well for all concerned.

The monthly meetings of the committee are reported in our shop paper, and the names of the men having made suggestions, or having ideas that were brought up

the discussion is not limited to foremen. Letters accepted and published will be paid for

for discussion are always published. In this way they are sure of credit being given them. The main reason why such committees are successful is because the employees feel that they have some voice in the affairs of the company, which makes them more interested in their own work and in the success of the company which employs them. On the whole, we feel that the employment of committees for shop problems has been successful.

—Frank A. Hyde, *Timekeeper, Walworth Company, Kewanee Works.*

✻

Oil Cups or Force Feed?

IT IS my business to order a considerable amount of machinery over the period of a year, and the design of this machinery calls for an oil pump lubricating system in all cases. An oil pump, when operating properly, distributes an even flow of oil to all working parts of the machine.

After a thorough study of conditions surrounding the two systems, we have found that where an oil pump force feed system is used, less oil is consumed over a period of a year. The machine and surrounding floor space is much cleaner, there are fewer breakdowns, and above all, the life of the machine is extended. Where there is a continual flow of oil, the grit and abrasive material is carried back to the oil tank, where it settles to the bottom, and is removed.

—Fred Aug. Schmidt, *Industrial Engineer, Western Electric Company, Kearney Works.*

✻

Reporting Minor Accidents

THE general plan of accident prevention work should be conducted in such a manner that anyone receiving an injury will feel as free to make a report and receive first aid as he would to go to the toolroom for tools. Any plan that creates rivalry between the different departments brings about a condition in which the real purpose of accident prevention work is lost.

The average worker feels that he is a good sport, and rather than cause his foreman and his department to lose the prestige, he will not report a minor accident.

Observations indicate that too much publicity, more especially of the competitive type, has just the opposite psychological effect from what is intended. Accidents increase during periods when new men are being taken on. These men are naturally under a greater strain than the old employees because of their changed environment and the desire "to make good."

At such times, if too much stress is placed on safety first methods, it increases the already high nervous tension to a point where safety consciousness is lost rather than gained, and accidents follow.

In my opinion, safety first education in a quiet way by means of personal contact with the foreman, carefully selected posters that convey striking examples of dangerous practices, and explicit explanations in plant bulletins of hazardous conditions to be avoided will do more to accomplish the desired purpose than any competitive plan of which I have knowledge.

—R. L. Wann, *Personnel Department, Portland Gas & Coke Company.*

I DO not believe that the no-accident record is as sound as some executives seem to think, because nine out of ten men will keep still about a minor accident for fear that they will lose time and be blamed for spoiling the no-accident record. Using educational methods will get far better results. I have in mind a plant that maintains a safety committee composed of the superintendent, the employment manager, and two foremen. This committee makes a tour of the works once each week, and the department having the least safety hazards and the best kept machines, receives a sign worded to that effect. Safety bulletins are placed in conspicuous places throughout the plant, and a sign on the main gate reads, "If you are a safe workman, there may be a place for you in our organization."

—R. G. Graham, *Head Inspector, Advance-Rumely Company.*

* * * *

THE · NEXT · TOPIC

"Should the Workman Share Responsibility?"

Shall We Buy Tools by the Pound?

Summary of the Discussion

Ed was favorably impressed by what he had read about the qualities of the new tungsten-carbide tools, but thought that the price asked was out of all reason. Al tried to convince him that he would be buying results, not steel, and that not only its cutting speed, but also its other advantages must be taken into account, when considering its price.

MOST of the discussion centered around the use of new tungsten-carbide cutting tools. The opinion generally expressed was that in purchasing these tools, the buyer was paying for service instead of material value. It was contended that the service value of the tools should be fixed by their production possibilities as compared with the existing facilities. Upon this basis of comparison the purchase price was not excessive.

There was no dissenting opinion as to the wisdom of buying such tools, provided the prospective user had machines rigid enough to stand the high cutting speeds without chatter. One or two contributors held that, even with old machines, the user would reap no small benefit by running them at the usual speed, with practically permanent cutting tools, and that this practice was to be recommended for machines where, for any reason, all the tools could not be made of tungsten carbide.

A foreman expressed the general sentiment by saying that profits were made not by hoarding but by judicious spending. An engineer illustrated the statement by pointing out that material costing $500 a pound but giving $600 worth of service, was cheaper than $1 material that gave only $1 worth of service.

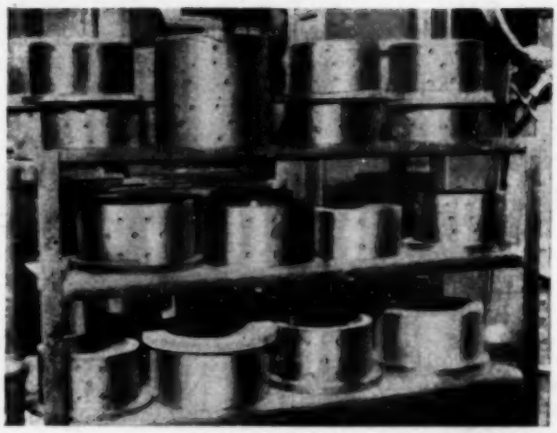


Fig. 1—Worn floating bushings for locomotive connecting rods and brass castings for new ones are placed adjacent to the turret lathes where they are finished

SERVICING Floating Bushings *for* Connecting Rods

By FRANK W. CURTIS

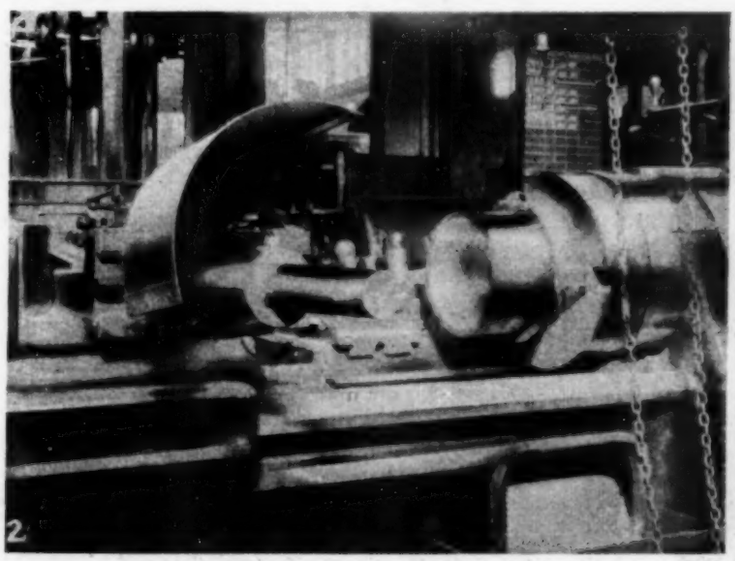
Replacement bushings for locomotives are sometimes made on the Santa Fe by pressing together two worn bushings and machining the unit to the required size

BUSHINGS of the floating type for locomotive connecting rods are constructed and repaired at the San Bernardino (Calif.) shops of the Atchison, Topeka and Santa Fe Railway system in a separate department arranged especially for this class of work and equipped with suitable machinery and tools to permit economical handling. The making of new bushings is done along conventional lines, but the salvaging of worn bushings is somewhat novel.

The usual method of fitting floating bushings is to allow a clearance of $\frac{1}{64}$ in. between the bushing and the rod and a similar clearance between the bushing and the driving pin. When a prescribed amount of wear has taken place the bushing must be replaced. Sometimes a worn bushing from one installation can be remachined with minor changes to suit another rod assembly, in which case there is considered to be an economy. In other instances the proportions of a group of worn bushings just lack certain dimensions to make them usable, and this condition of course results in the accumulation of unusable material.

To overcome the loss of such material, the Santa Fe shops salvage worn bushings by assembling two together and then remachining the assembly to the desired specifications. Sometimes the outer wall is made of a new casting into which a worn bushing is pressed, and at other times two worm bushings are pressed together, providing, of course, that their specifications warrant the construction. By this form of salvage the stock of worn bushings is kept to a minimum and material which otherwise would be scrapped is now used advantageously.

A rack is provided for the housing of worn bushings and new castings as illustrated in Fig. 1. It is made so that the bushings resting on it can be checked for general



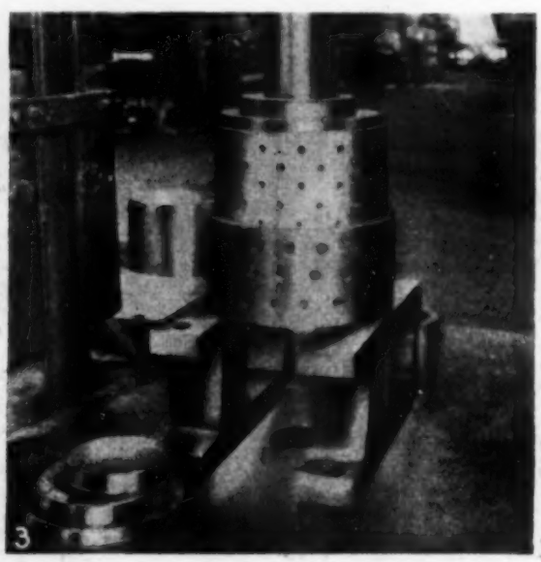


Fig. 2—Set-up for boring the bushings in a turret lathe, showing guard to divert the chips to the machine bed. Fig. 3—Salvaging two floating bushings by pressing them together after finishing the bore of one and the outside of the other. The work is done in a hydraulic press using plates under the ram

specifications without trouble and readily withdrawn for use when needed. It is located adjacent to the turret lathes so that the operator can refer to the material in hand when he receives an order for a bushing. The operation on one of the turret lathes used in connection with the machining of bushings is illustrated in Fig. 2. The work is held in a three-jaw chuck so that it can be bored, turned, and faced at one setting. The turning and facing are done by the front tool slide, whereas boring is done by boring bars mounted in the turret. On account of the characteristics of the brass to be turned, which has a tendency to throw the chips some distance from the tool, the boring bar is provided with a sheet-metal hood as shown at the left, which forces the chips to fall in the bed of the lathe.

Assembling of two bushings is done in a hydraulic press by placing one bushing on two parallel supports and then assembling the other bushing on top of it, both being aligned to suit the center line of the ram. Suitable circular plates are placed over the opening of the upper bushing to form a contact for the press ram as indicated in Fig. 3. This illustration shows a set-up for pressing a main rod bushing into a metal connection bushing. The allowance made for a press fit on bushings varying from 8 to 12 in. in diameter is 0.01 in. When two bushings, such as those shown, are to be fitted together, the procedure is to bore the hole of the larger bushing and turn the outside diameter of the bushing to be pressed into it, and then assemble them as outlined. From here, the assembly is returned to the turret lathe and is finished up all over to the desired size. Before the bushing is taken from the lathe, a spiral, with a 1-in. pitch, is scribed upon its surface. It is then laid upon the templet shown at *A* in Fig. 6 and scribed as *B* shows. The holes in the bushings are drilled in the jig illustrated in Fig. 4.

Fig. 5—Greasing the countersunk holes in connecting rod bushings with a compression grease gun

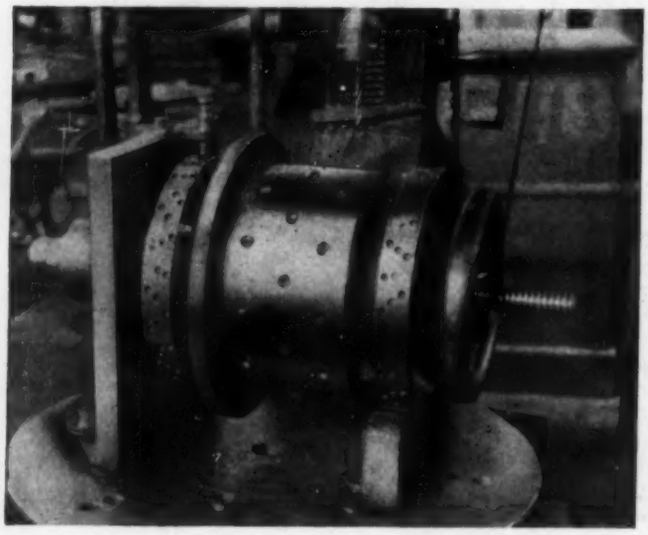


Fig. 4—An indexing jig used for drilling grease holes in floating bushings in a wide variety of spacings

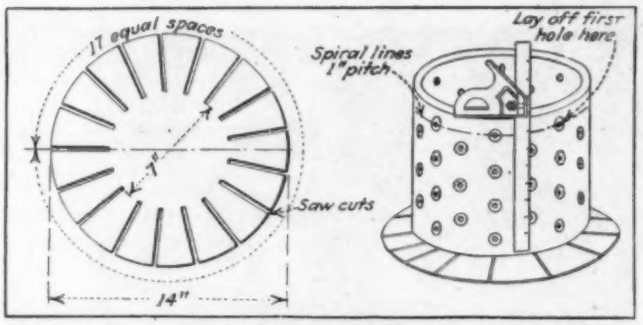


Fig. 6—Templet for laying-out grease holes in spiral line scribed previously

The work is supported by two cone-shaped end plates which grip the work from the bore when moved together. The rotating member of the jig is supported on an angle-iron bracket attached to the machine table on which a locating or indexing plunger is situated. The plunger fits into indexing holes located on the periphery of one of the cones. The jig is made so that it can be clamped to the angle iron support by either end and since each cone is provided with a series of indexing holes, it is possible to drill a large variety of equally spaced holes.

A hand-operating greasing device for applying grease to the countersunk holes in bushings is illustrated in Fig. 5. The body of the device is made in the form of a shell into which a cake of grease is placed. The inner wall of the body is made with threads into which a plunger is screwed. The lower portion of the body has a nozzle attached to it, through which the compressed grease passes. The body of the device also has a handle welded to it so that in operation the operator holds the plunger handle and turns the body. Approximately one-quarter of a turn is sufficient to issue the correct quantity of grease for a hole. The device can be moved from hole to hole to suit and a bushing can be completely greased in a relatively short time.

What Is a Slot—*Discussion*

By L. O. Brown

Toolroom Foreman, Holcomb & Hoke Manufacturing Company

DURING the past few months there has been considerable discussion regarding the distinction between slots and grooves, following the query on page 202, Vol. 70, of *American Machinist*. While grooves and slots are similar to a great extent, there is one important difference which determines the proper classification. Both may be located in any face of an object, at any angle possible and be straight, bent, or curved. Either of them may have one, two, or no ends. Each has two sides, and a groove has a curved or flat bottom, while a slot has no bottom at all, because it goes entirely through the neck of the object on which it is located. A neck is a shallow type of groove, and is always found on round objects.

WORK-HANDLING DEVICES
Bring Approach to Ideal
AUTOMATIC GRINDING

By J. E. CASTER
Cincinnati Grinders Incorporated

Magazine feeds and hoppers make it possible, in a number of typical cases, to keep the grinding wheel cutting continuously or nearly continuously on the work

AN IDEAL automatic machine would be a device requiring no human assistance whatsover. In practice, of course, certain intermittent human control of the machine must take place. Thus, the time element enters into the question of machine automatism, and, in an effort to indicate the relative amounts of required attention, a number of rather vague gradations, such as full-automatic and semi-automatic are extensively used.

The main considerations in this article are given to the moving parts of the machine, with the assumption that the lubrication of bearings and wear of cutting tools and machine parts, due to friction or abrasion, do not interfere with machine operations. However, if these items require frequent control or compensation, self-acting means performing corresponding operations should be provided if the machine is to be considered fully automatic.

It is evident that the longer the interval of time between two successive human assistances, the greater is the automatic value of the machine. The absolute time measurements, however, would not be equal, for a machine whose duty is heavy and complicated and for a machine performing a single and rather simple operation. Thus the size and methods of handling the work prior to and after machining also occupy a prominent place.

In order to summarize these facts, the following general classifications are proposed and later illustrated by actual examples of a machine which, if considered on a present conventional machine-tool scale, can be rightfully called an automatic machine, namely the centerless grinder.

1. A "full-automatic" machine tool is one requiring no other attendance than general supervision and occasional checking of finished pieces. Obviously, the work is supplied to the machine by means of some such device as a hopper or conveyor, and no previous arrangement of pieces to be machined in any order is required. Upon

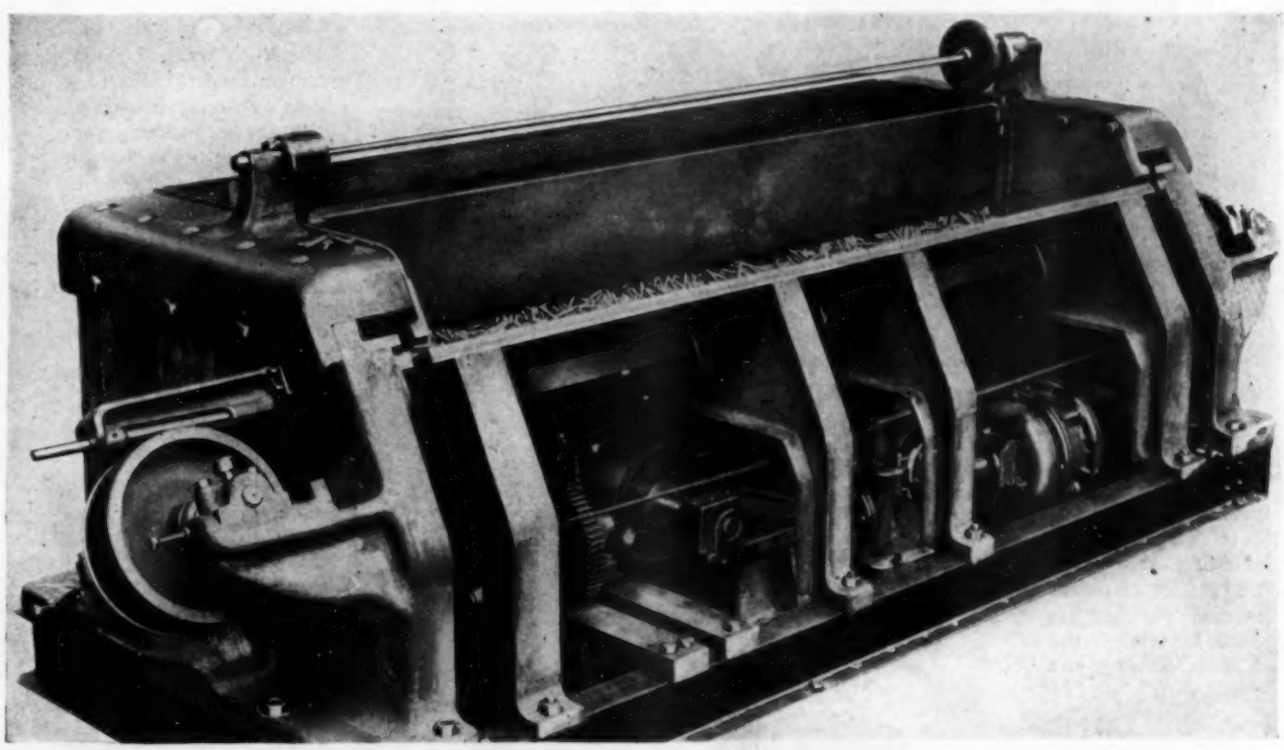


Fig. 1—Hopper for feeding carbon electrodes to a centerless grinding wheel. This is an example of a full-automatic operation

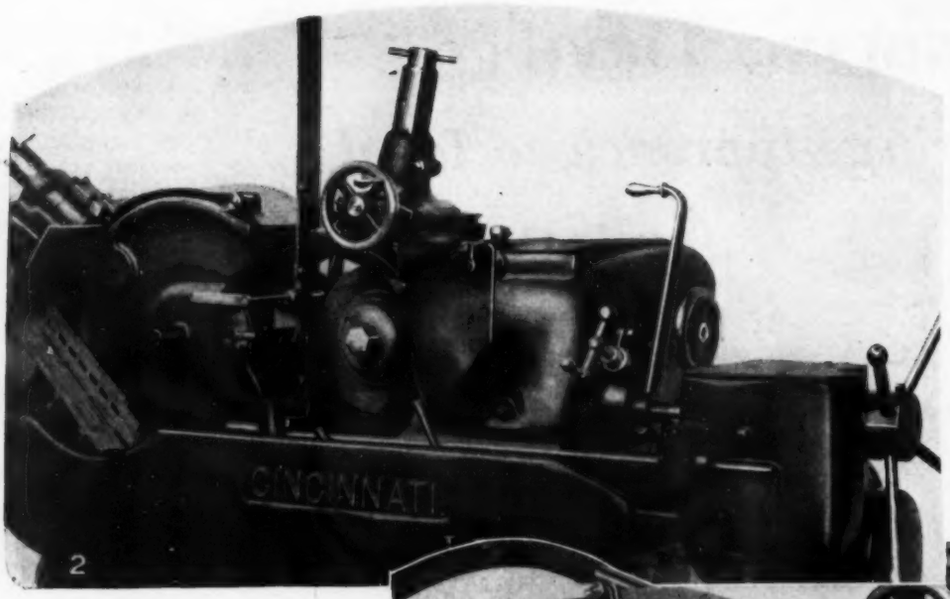


Fig. 3 — The grinding of steel bars up to 4 in. in diam. and 24 ft. long is classed as a semi-automatic operation since the loading operations require human effort. Fixtures, however, take care of the operation proper

Fig. 2—Magazine for the automatic through-feed of trip-staffs

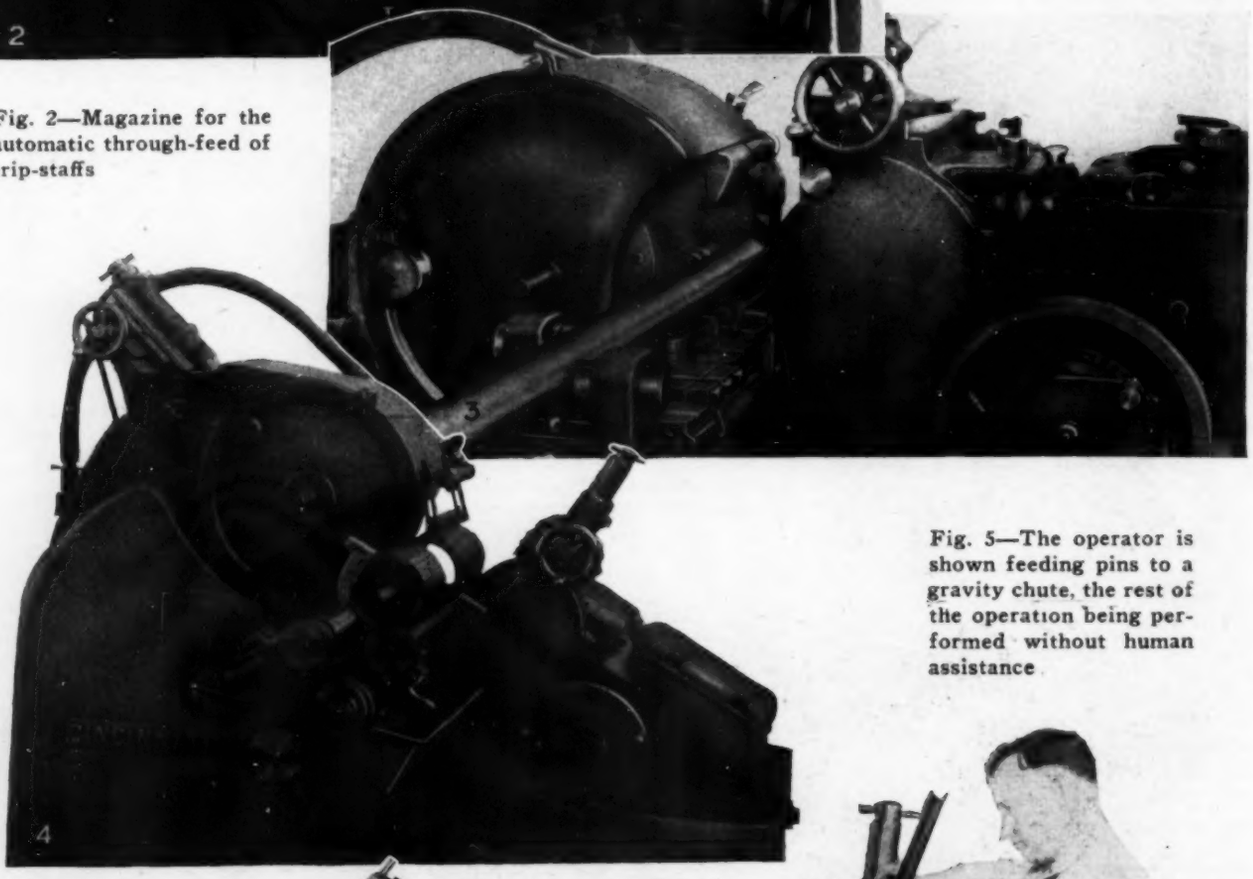


Fig. 5—The operator is shown feeding pins to a gravity chute, the rest of the operation being performed without human assistance

Fig. 4 — A power-operated carriage automatically pushes anti-friction bearing races to the grinding wheels in this set-up. A second carriage is loaded while the first is passing the wheels

completion, pieces are checked as to size, and necessary compensations in the set-up are performed by respective mechanisms. Means should also be provided for the separation of defective pieces and disposition of satisfactory work in a suitable manner. From the preceding it is evident that the nature of the operation is usually rather simple, and work is of medium or small size. The performance of the machine is continuous, no human control of power being necessary.

2. An "Automatic" is a machine tool which requires human assistance but once per charge of work, the charge consisting of a great number of pieces; or once per single piece provided the operations are numerous and complicated. The time required for human handling should be only a negligible fraction of that taken by actual machining. Work of small size may be arranged in certain order in the feeding device previous to placement on the machine. Checking of the finished pieces and readjustment of machine elements should take place once per several pieces, respectively. Obviously, the magazine, revolving drum, cam, or any other power, gravity, or weight actuated feeding devices involving the principle of pre-arranged work come under this definition of automatic class.

Ejection of work upon completion of the machining cycle may be performed manually in case of complicated machine operations, and mechanically in case of single-operation machines. The size of the work cannot be commented upon as its only limitations are the proportions of respective machines.

3. A "Semi-automatic" is a machine tool which incorporates certain features reducing the mental or physical efforts of the operator. However, the savings in time due to these devices and the reduction in the number of the otherwise required motions by the operator at the start, during, and at the end of the machining cycle should be very pronounced.

The principal advantages of automatic features are as follows:

1. Elimination of fatigue on the part of the operator;
2. One man is able to attend to more than one machine.
3. Less-skilled labor may be employed.
4. Uniform control of production is obtained, as the machine can be speeded for a given number of cycles per minute and the productivity will be maintained regardless of the operator.
5. Elimination of spoiled work due to inattention, negligence, or inexperience on the part of the operator.

Centerless grinders are fundamentally multi-purpose, highly versatile and productive machine tools. The versatility of the centerless method is well illustrated by comparing a balance staff 0.04 in. in diameter and ½ in. long, and a bar 3 in. in diameter and 20 feet long; both of these parts being ground on the same machine. It is commercially and practically impossible to provide means for full-automatic operation on one standard machine handling such a wide variety of work. The full automatic principle could be carried out only on machines designed with an idea of performing several successive or simultaneous operations on a particular class of work, and especially on a piece of a definite design. Thus the full-automatic principle is usually limited to single-purpose machinery.

However, there are a few centerless installations which can be properly included into the full-automatic class, as, for example, the one for grinding carbon electrodes. The hopper arrangement shown in Fig. 1 is used for feeding the electrodes to the machine, and the size and finish of the work are maintained over long periods of time because of negligible wear of the grinding wheel. For the same reason, the inspection of the work and the truing of the grinding wheel may be performed but once a day. In fact, the majority of centerless grinding operations using either standard or special attachments may be placed in the automatic and semi-automatic classifications.

Magazine infeed grinding of balance-staffs furnishes a good illustration of automatic operation. The centerless method consists of the simultaneous finishing of the balance-staff body diameter and tapered ends, which are ground concentric with the body and have a true conical shape. Due to the large diameter of the grinding wheel and the small size of the work, practically no wheel wear occurs, so that truing operations are required very seldom and accurate sizing is easily maintained. Supply of the work to the wheels is controlled by a special reciprocating plunger which derives its motion from the automatic infeed attachment. Two removable and very accessible magazines are used so that one magazine can be loaded while the other is being emptied on the machine. The operator's attention is required but once per charge of the magazine.

Other Uses of Magazine Feeds

A number of other installations using special fixtures for grinding certain work are similar in their idea to the one just described, as, for example, the automatic magazine through-feed of trip-staffs, Fig. 2, the automatic hopper end-feed of taper pins, and the automatic magazine in feed of drills either straight or with back taper.

Steel bars up to approximately 4 in. in diam. and 24 ft. long are ground to close limits as shown in Fig. 3. This method, however, could not be properly classified under the automatic class, although no attention is required during the grinding cycle, as the loading operations require certain human efforts and time. Bar grinding is a typical example of semi-automatic work.

Work such as anti-friction-bearing cups or races is also ground automatically. In Fig. 4 this latter is shown. The races are banked on the fixture and are pushed to the wheels by means of a power-operated carriage. While the first group is being ground, a second stock of races is arranged in the rear of the carriage and is, in turn, pushed to the wheels by bringing the carriage back and engaging the last cup by spring-operated fingers. The traverse rate of the work between the wheels is regulated in the usual way, provision having been made for that purpose in the fixture.

Gravity chute feeding of parts similar to piston pins, Fig. 5, is also included in the semi-automatic class, as the operator's assistance is required only in loading the chute. Similarly, the use of the automatic infeed attachment in connection with infeed grinding of certain work renders this operation semi-automatic as the only duty of the operator is to load the work, the rest of the cycle being performed without human assistance. Thus, the centerless grinder may be equipped with fixtures, so that its operation approaches the ideal automatic machine tool inasmuch as the cutting tool is performing continuously in the through-feed method, and practically continuously in the infeed method.

· BOOK · REVIEWS ·

INDUSTRIAL ECONOMICS. *By Dexter S. Kimball, A.B., M.E., LL.D., Dean of the College of Engineering, Cornell University. 312 pages, 6x9 inches. Illustrated by halftones, drawings and diagrams. Bound in cloth boards. Published by McGraw-Hill Book Company, Inc. New York. Price $3.*

FOR many years Dean Kimball's course in industrial economics for the junior mechanical and electrical engineers at Cornell has been one of the most popular in the curriculum. It gives the general economic background for the whole manufacturing industry, and serves as a prerequisite course for the senior work in industrial engineering. This book represents a careful revision of the material on which the junior course is based, and is not only instructive but interesting reading as well.

As a text book for similar courses, this book fills a real need. At the same time, it will give to the man in industry who has never had the time nor the opportunity to study the industrial picture as a whole a comprehension of that picture that will show him where his own small part fits in, and what industry is all about.

Dean Kimball has as clear a conception of the economic significance of modern industry as anyone in this country. His book is evidence of this fact.

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THE HANDBOOK OF CORPORATE MANAGEMENT AND PROCEDURE. *By Earle A. Saliers, Ph.D. Formerly professor of accounting, Northwestern University. 1237 pages, 5½x8½ inches. Profusely illustrated. by charts and forms. Bound in cloth boards. Published by McGraw-Hill Book Company, Inc., New York. Price $7.50.*

DR. SALIER'S book is intended to provide ready reference material on all the common problems of corporate management and organization for those charged with the responsibilities for those functions. It is essentially a reference volume.

The 31 chapters are grouped into three parts, corporate organization, finance, and management and control. For those without extensive experience in corporate affairs the book should be very useful, and for those of wider experience it provides in small compass the details that are sometimes elusive.

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THE STORY OF THE BALTIMORE AND OHIO RAILROAD. *By Edward Hungerford. Seven hundred and forty pages, 6x9 in. Cloth board covers. Published by G. P. Putnam's Sons, New York, N. Y. Price $10.*

ROMANCE and railroading have always gone hand in hand. But in no case is this more true than with the Baltimore and Ohio Railroad. From its very inception in 1827, at a time when the steam locomotive was much more of a dream than a reality, the daring of those who projected the road and the faith of those who subscribed the money that made it possible, mark it as an unusual enterprise. Not only has the building of the road become historical, but it numbered among its founders men who had already made history, such as Charles Carroll of Carrollton, who at the time of the laying of the cornerstone on July 4, 1828, was the last survivor of those who signed the Declaration of Independence.

Both as an example of road building over difficult territory and as a pioneer in developing suitable motive power the Baltimore and Ohio stands in a unique position. The early struggles in both of these departments are outlined by the author of the book in a pleasing manner. The volumes are not only historical, but serve as entertainment as well. Illustrations are profuse in number and add much to the value of the text and the enjoyment of the reader. As a record of achievement in transportation the volumes are of great value and will be highly prized as the years go by.

*

FORMULAS IN GEARING. *Two hundred sixty-five pages, 6x9 in. Indexed. Cloth board covers. Published by the Brown & Sharpe Manufacturing Company, Providence, R. I. Price $1.50.*

A COMPANION volume to the "Practical Treatise on Gearing" written for the designer, draftsman, and engineer is this book of formulas which has been issued in revised form. Several additions have been made, among them the calculations for the long and short addendum for spur gears and stub tooth gears. Data on generated straight-tooth and spiral-bevel gears using the Gleason Works system are also given. Numerous tables are included, among them figures on the strength of gears of both metallic and non-metallic materials, including outline factors for 14½- and 20-deg. pressure angles, and similar tables. The latter pages are devoted to tables including diagrams for the solution of right angle and oblique angle triangles, logarithms for gear ratios (for determining change gears to be used in gear cutting), and also the latest A.G.M.A. recommendations. The book is well illustrated and should prove of considerable assistance to the engineer and draftsman.

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PRACTICAL TREATISE ON GEARING. *Two hundred forty-three pages, 6x9 in. Indexed. Cloth board covers or paper covers. Published by the Brown & Sharpe Manufacturing Company, Providence, R. I. Price: Cloth $1.50, paper $1.*

THIS is a revised and enlarged edition of a book that has become widely known as a text for the shop man. It covers the subject in a comprehensive manner, beginning with explanations of the various terms used in gearing and carrying through to applications of various types of gears in machine construction. New material consists of a discussion of the 14½-deg. composite system and the conjugate rack. Methods of laying out and the shape of gear teeth for the composite or range system, involute, and cycloidal system are given. Various useful tables, including the tables of trigonometric functions and natural sines and cosines, are given, as well as the latest A.G.M.A. recommendations. The book is profusely illustrated in addition to many tables and formulas. Its straightforward method of presentation should be a boon to the shopman who does not have time to acquire a technical knowledge of the subject.

Insuring Weld Reliability *By Testing Welders*

By Paul Orr

Works Department, Westinghouse Electric & Manufacturing Company

A weld is as strong only as its weakest part, and its quality is a direct reflection on the ability and intelligence of the welder

With the diversified utilization of arc welding in its many applications to manufacturing, building, and maintenance work, it has become imperative that a standard be set to which the operators must comply. Many of the large industries have formulated their own test or check-up systems for the guidance of their welding operators in an attempt to standardize welding.

More than 160 arc-welding operators are employed at the East Pittsburgh and Trafford City plants of the Westinghouse Electric & Manufacturing Company. These men are called upon to do many kinds of welding. Their work includes the welding of light sheet iron; heavy steel plates; oil-, steam- or vacuum-tight pieces; heavy structural steel in the fabrication of buildings; and all types of maintenance work. The welding on the different classes of work varies from a $\frac{1}{8}$- to a 1-in. weld, and on some work as much as $1\frac{1}{2}$ in. of welding metal is deposited.

Every four to six weeks, a general test of the work of each welding operator is made. Welders of special work are asked to make test welds of work similar to that which they are doing, and, as an extra check, in the variety of positions in which they must do the work. These tests are regulated somewhat by the type of work being done. Because maintenance welders are called upon daily to make welds in horizontal, vertical, and overhead positions, they are required to weld their test plates in these different positions. This test is a very practical method for the operator to demonstrate his ability as a welder of complicated structures.

Sometimes, the size of the welding wire and the quantity of the current are specified, but in hand welding it is often better to let the operator select these factors himself, to develop his self-confidence. The quantity of the current to be used is determined by the heat at the point of the electrode necessary for the best fusion and penetration with the parent metal. The operator is, therefore, instructed to rely upon the amount of heat and the degree of penetration he gets at the point of the electrode instead of the amperes prescribed for welding wire of a given size. An experienced welder develops a "feel" of the arc and a sensing of the reaction of metals to welding, and can determine readily when he has obtained the correct setting. This condition is the ideal one to be reached in training an operator. The less-experienced men are instructed as to the best amount of current to use with a given-sized welding wire for work of a certain size until they become proficient in such work.

Physical tests of welds are beneficial to the operator, in that they give him definite data as to the strength of his weld in so many thousand pounds per square inch. This has a good moral effect on the man taking the test. For the standard tensile test, two pieces of $\frac{1}{2}$x6x12-in plate are used. They are prepared and welded in the different positions shown in Fig. 1. In Fig. 2 is shown the test plate cut into strips and

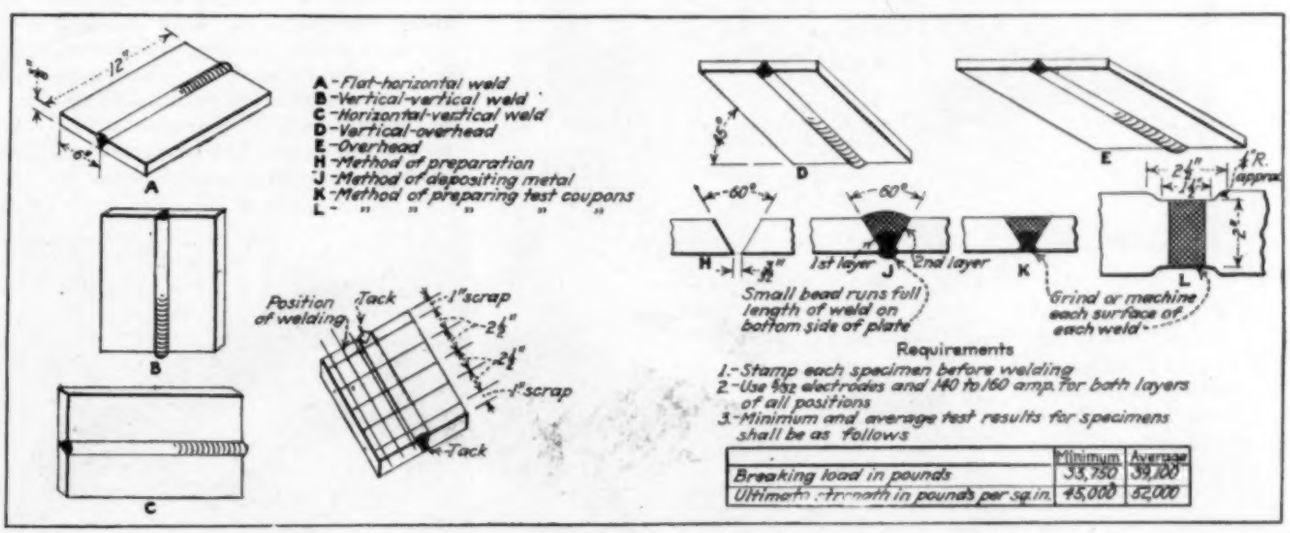


Fig. 1—Standard test welds and their requirements

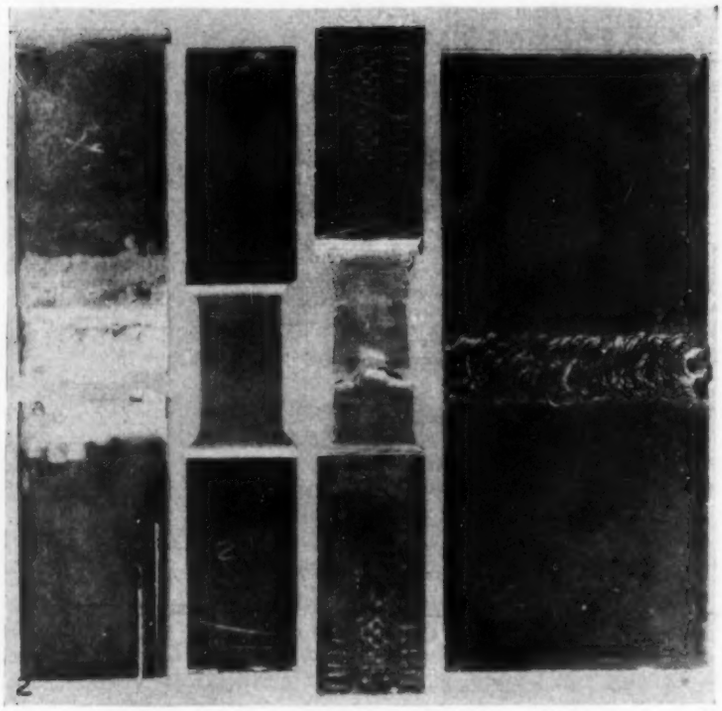


Fig. 2—A test plate is made by butt-welding together two ¾x6x12-in. plates. It is then cut into six strips. The two outside strips are scrapped because the weld was started on one and stopped on the other. The four remaining strips are machined for physical test-pieces. Two are subjected to tensile and two to bending tests

Fig. 3—Testing a weld for air-tightness. A test plate of the same dimensions as described in Fig. 2 is used, but instead of being cut into strips, the weld is reinforced 10 per cent. The plate is held in place over the opening of an air-tight box by heavy clamps, being sealed by a soft-rubber gasket. Liquid soap is used as a leak detector

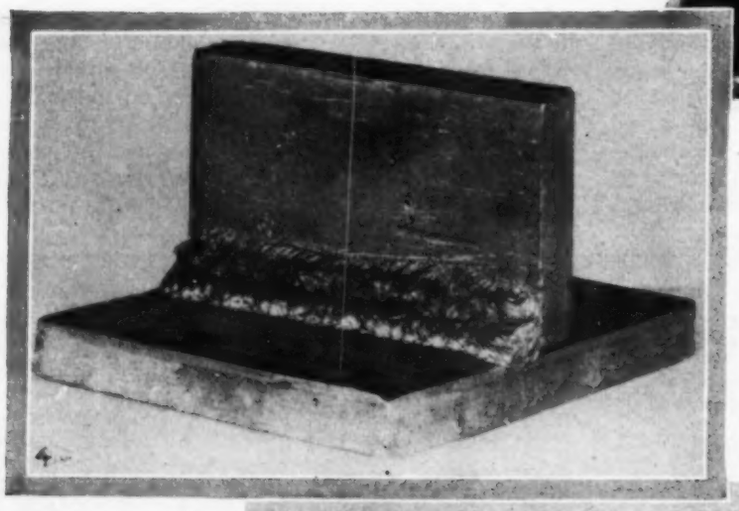
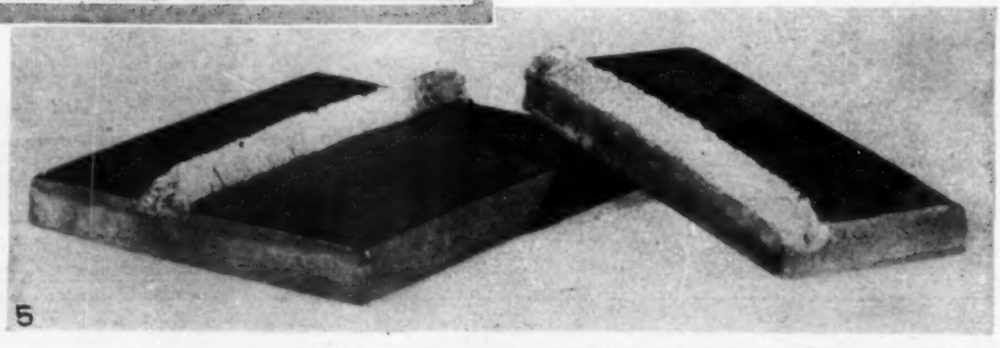


Fig. 4—A standard T-weld. The specimen consists of a ¾x3x6-in. plate, welded at right angles to a ¾x6x6-in. plate, the weld being in three layers and on one side only. After the weld has been graded by visual inspection, it is broken by applying pressure to the vertical member, on the side opposite the weld. The value of the weld is rated according to the amount of clean metal shown in the break

Fig. 5—The clean metal in the break indicates that this weld should be rated 100 per cent



machined for the tensile test. This plate is welded in a horizontal position. In most cases, four specimens, 2½ in. in width, are cut from the test plate, using two for the tensile test and two for the bending test. The outside inch on each side of the plate is scrapped because of the starting and stopping of the weld at these points. The specimen marked 1 broke at 51,350 lb. per sq.in., under a tensile test.

The bend test is made by supporting the test piece at the ends and applying pressure in the center or directly over the weld until breaking takes place.

The test used in the examination of the operators employed in making oil- and steam-tight welds is as follows: A plate of the same dimensions as those of the tensile-test plate is used, but instead of cutting it into test specimens, the welder is instructed to reinforce the weld ten per cent and then to test it under air pressure. The air-testing box used is made from ⅜-in. plate. It is 3-in. high and 10-in. square, having a ⅜-in. pipe connection fitted with a valve to regulate the pressure. The test plate is held in place with heavy clamps and is sealed with a soft-rubber gasket. The set-up is shown in Fig. 3. Liquid soap is used as a leak detector.

It has also been found beneficial, in checking the operators, to use what is termed "The Standard T-weld," as shown in Fig. 4. The T-weld test furnishes an economical means of checking the welding ability of the operators, since this type of joint typifies those encountered in actual welding work. The specimen consists of a ¾x3x6-in. plate welded at right angles to a ¾x6x6-in. plate with a ¾-in. weld; that is, a weld extending ¾ in. on each plate. Three layers of weld metal are used on one side only.

Central Testing Laboratory Employed

After the T-welds have been completed, they are delivered to a central laboratory to be tested. Three men are selected to grade the tests—a welding engineer, a welding inspector, and a practical welder. The grading is, E (excellent), G (good), F (fair) and P (poor). First, the welds are graded visually as to appearance relative to overlap, burned appearance of metal, and neatness of workmanship. They are then broken by applying pressure on the upright plate, on the side opposite to that on which the weld is made. Next, the welds are rated as to the actual amount of clean metal shown in the break. The weld illustrated in Fig. 5 is what is classed as a 100 per cent weld, showing a clean break from the apex of the angle to the center of the hypotenuse.

It is believed that the T-weld test is one of the best for welders working on heavy structural and plate members, especially on structural-steel buildings, where more than one layer of metal is deposited. Many operators making this weld fail to get the proper amount of penetration on the horizontal plate, owing, in most cases, to not having concentrated the heat of the arc on the heavier section. Many supposedly-good operators get a rating of only 50 per cent on this type of joint, but after seeing the breaks on their test pieces and learning the cause of their poor work, they can, and do, readily correct their faults.

In all tests and examinations, certain requirements are to be met by the persons being examined. Either a reward or a penalty goes with good or bad work. Good workmanship is rewarded by an increase in earnings and by a progressive system of promotion. The progressive system used in most departments makes possible the advancement of a welder as rapidly as he can improve his daily work, and as shown by the periodic tests, as soon as he can make good progress in the quality of his work. In the tensile test, the welder is graded in proportion to the number of pounds per square inch at which his test piece failed. In the T-weld test, he is graded by the amount of clean weld-metal shown throughout the break. A perfect weld is awarded 100 per cent, while one showing 20 per cent poor fusion with 15 per cent of slag inclusions is awarded a grade of 65 per cent only.

In the latter case, the operator who did the work is called into the foreman's office, the inside of his test weld is shown to him and the cause of his low percentage is explained, so that he may correct these faults in his future work. He will then be requested to make another test piece to check his ability to correct the defects in the piece just examined. If he fails in the second test, he is sent back to the welding school at the East Pittsburgh plant. There he is given further instructions in connection with the work in which he is engaged. His work must be satisfactory before he can resume production welding.

What Obsolete Equipment Costs
Discussion

By Peter A. Brill
Tool Designer, Taft Pierce Manufacturing Company

THE first two formulas introduced in the articles in the *American Machinist*, beginning on page 764, Vol. 70, under the above title, seem to be lacking an essential factor. This is, however, applied in the formula of the A.S.M.E., namely, the percentage of the working year during which the equipment will be in use or to go still more into detail, the percentage of time during which the equipment will be in use at a saving.

Of course, in the case of the turret lathe and the vertical boring mill, there is no doubt that these machines can be used to advantage during almost all of the year. Not in every shop, however, will this be true of a duplex miller, an internal grinder, or a "Mult-Au-Matic," unless the production of the part or parts for which these machines are to be installed is sufficiently large to keep them going for economic periods.

The Warner & Swasey method should give more accurate results, if, instead of computing the yearly output from the number of working days and the number of pieces per day, the required output per year were used. The same holds true for the S.K.F. formula, where the expression $(R_P - R_E)\ N_D D_M$ might be multiplied by a factor: X = percentage of year during which equipment will be in use, the same as in the formula of the A.S.M.E. As this factor denotes a percentage it is unimportant whether it is computed yearly or monthly as long as an average value is obtained.

This modification of the formulas should, I think, make them more applicable to the small shop, where production may leave an expensive machine idle during a large part of the year. This will cut the yearly savings somewhat, but it will not affect the net saving per piece produced. In most cases, a substantial yearly saving will result from the purchase of up-to-date equipment, even if it can be kept busy only part of the time.

IDEAS FROM PRACTICAL MEN

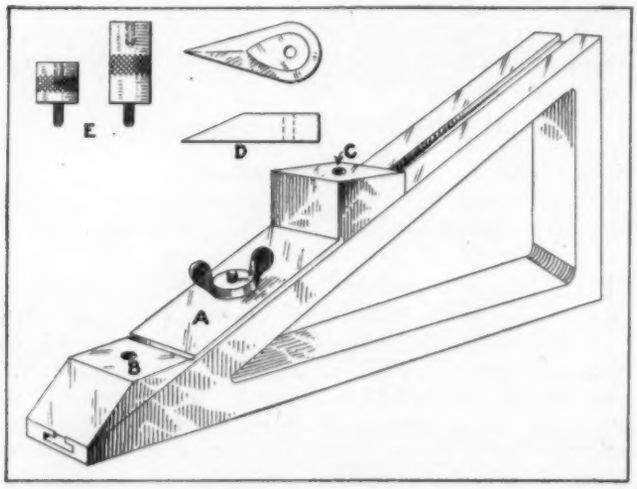
The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

An Accurate Scribe Block for Toolmakers

BY CHARLES DOESCHER
Foreman, Scovill Manufacturing Company

Any one who has had occasion to scribe lines very close together, knows that it is more or less of a fussy job. By the use of the scribe block shown in the illustration, such jobs can be done with ease and certainty.

By referring to the illustration, it will be seen that the inclined surface of the triangular block has a T-slot running its entire length, and that by the aid of this slot and a thumb nut and a T-head screw, the sliding block *A* can be secured in any position thereon. The flat surfaces *B* and *C* on the sliding block are hardened and are ground parallel with the base of the triangular block, so that by moving the sliding block up or down the inclined surface, the distance between the base of the triangular block and the surfaces *B* and *C* will be increased or diminished. This distance can easily be determined by means of a micrometer, and by the same means the sliding block can be set so that these surfaces will be any desired distance from the base of the triangular block, within the range of the device.



Toolmakers' scribe block

The hardened scriber *D* is ground flat on the bottom and can be attached to either of the flat surfaces on the sliding block by a screw. When so attached, a line scribed by it will be at the same height as the surface to which it is secured is from the bottom of the triangular block, always providing that both the scribe block and the work on which the line is scribed, rest upon the same plane.

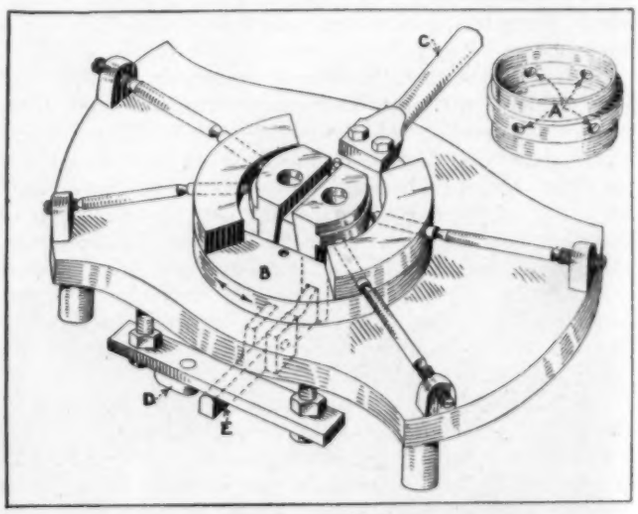
In cases where the distance between lines to be scribed is greater than the range of the device, hardened extension pieces, such as are shown at *E*, can be used. They can be screwed into the holes in the flat surfaces of the sliding block and the scriber can be attached to them by a screw, tapped holes being provided in their tops for that purpose. The extension pieces can be made any desired length and should be ground flat on the faces and shoulders.

Tool for Piercing Walls of Ammeter Cases

BY CHARLES H. WILLEY
Asst. Plant Supt., Hoyt Electrical Works

In the manufacture of pocket-type ammeters, the cases require to have four holes punched in their walls, as shown at *A*. To punch the four holes in one operation, we designed the tool illustrated. The plate *B* is pivoted to a base and carries all the working parts of the tool, being operated by the lever *C*. In operation, the case is placed over the dies in the center, locating pins engaging holes in the bottom. With the case in place, the dies, mounted on dovetailed slides, are forced apart by a wedge operated by the stationary cam *D* and the lever *E* from below, as the plate *B* is rotated. The dies being thus forced apart, hold the case firmly.

The punches slide in holes in lugs on the top of plate *B*, and are connected to ball and socket rods backed up by screws. With the plate *B* in the starting position, the ball and socket rods present angles to radial lines. Thus as the plate *B* is rotated, they assume and pass the radial position, forcing the punches inward and then withdrawing them. At the end of rotation of plate *B*, the lever operating the wedge between the dies has come out of engagement with the cam, and the dies have been forced toward each other by pins in the ends of the dovetailed slides striking stationary pins in the base. Since the ball



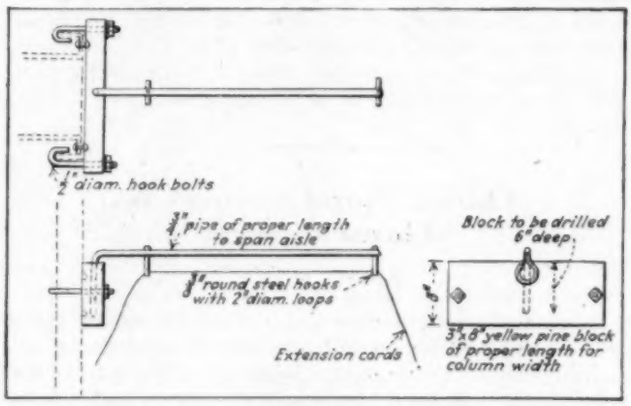
Tool for piercing walls of ammeter cases

and socket rods have passed the radial position, the punches have been withdrawn. With the various parts in the positions stated, the case can be removed from the dies and another one inserted. Rotating the plate *B* in the opposite direction repeats the cycle.

Keeping Electric Cords Off of the Floor

By Van Gilder

In a large aircraft factory, considerable expense was involved in the replacement of the electric cords on small hand-tools, where the cords were drawn across the traffic aisles, being walked upon by the men and


2" diam. hook bolts
3" pipe of proper length to span aisle
3" round steel hooks with 2" diam. loops
Extension cords
Block to be drilled 6" deep
3"x8" yellow pine block of proper length for column width

Bracket for supporting flexible electric cords

run over by trucks. A suggestion that got the prize money, was to attach inexpensive, removable overhead-brackets to the columns that lined the aisles, and to support the cords on the brackets. Thus, both trucks and men could pass under, rather than over the cords.

One of the brackets is shown in detail in the illustration. It will be noticed that the jib can be rotated in its base to give additional flexibility. Slight modification in the hook bolts may be necessary to suit columns of different construction.

Special Toolholders for a Planer

By H. F. Fiedler

In Fig. 1 is shown the end view of a casting that requires to be machined at *A* and *B* and the work must be accurately done. Eighteen such castings were mounted in two rows on the planer, nine in each row. Due to the amount of spring in ordinary tools long enough to

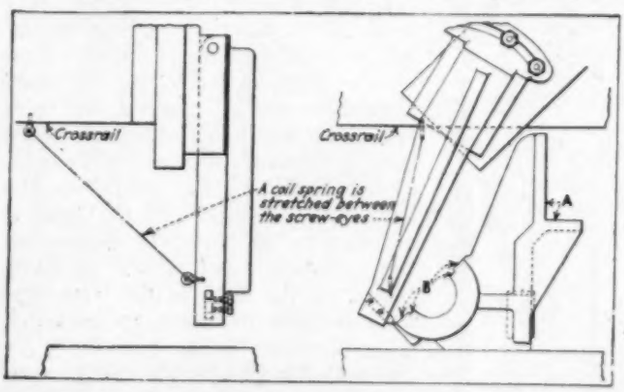


Fig. 1—One of the toolholders in place in relation to the work

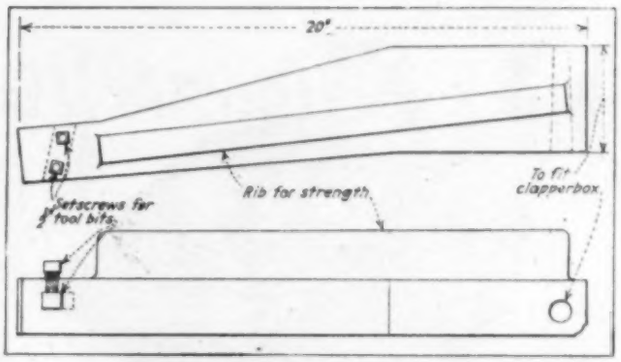


Fig. 2—Details of one of the toolholders

machine the surface *B*, two special toolholders were made, one for each of the planer heads.

One of the toolholders is shown in Fig. 2. Both toolholders were alike and were fitted in the clapper boxes in place of the regular clappers, being held by the same taper pins used to hold the clappers. Coil springs attached to screw-eyes in the bottom of the crossrail and to the backs of the toolholders, kept them from jumping at the ends of the cuts. Toolbits of the ordinary kind were held in square holes near the lower ends. The toolholders are very stiff and did the work without appreciable spring.

The right-angled surface at *A* was finished with regular tools.

Milling Steering Knuckles

By R. M. Charles

In one of the large automobile plants, steering knuckles are held for milling the insides of the king-pin bosses in the fixture shown in Fig. 1. The fixture holds two knuckles, each of which is clamped by its previously-

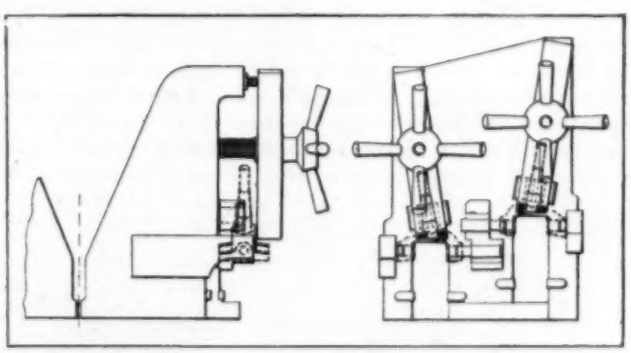


Fig. 1—Fixture for holding steering knuckles

machined spindle in a V-block, locating it for angle. It is held in position by two pins entering the king-pin holes from the outside.

The work is done in the duplex milling machine illustrated in Fig. 2, the heads of which are independently adjustable for height. Two pairs of cutters are used, each pair consisting of two interlocking, half-side cutters, adjustable for wear and for loss of width due to grinding.

The fixture holds two knuckles, which are machined simultaneously, and two fixtures are mounted on an indexing base on the machine. One fixture can be unloaded and reloaded while the knuckles in the other fixture are being machined. When the knuckles in one fix-

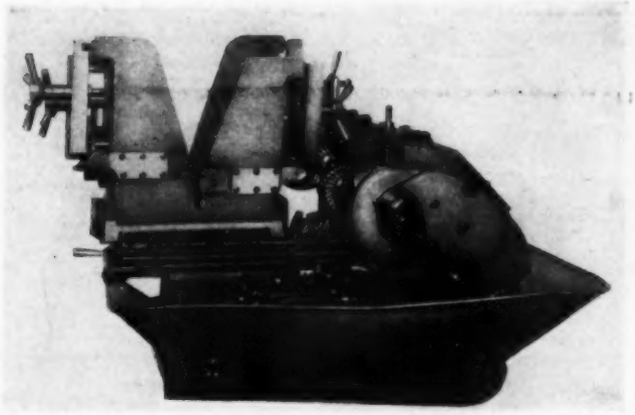


Fig. 2—The machine in which the milling is done

ture have been machined, the indexing base is rotated 180 deg., bringing the loaded fixture in place for its knuckles to be machined, while the fixture containing the knuckles just milled is brought to the loading station.

Movements of the machine table are automatically controlled by dogs located on the side. The speed of the cutters is 36 r.p.m. and the feed is 8.3 in. per min. The amount of stock removed from each boss is $\frac{1}{32}$ in., and the production is at the rate of 160 pieces per hour.

Universal Reaming Fixture for Connecting Rods

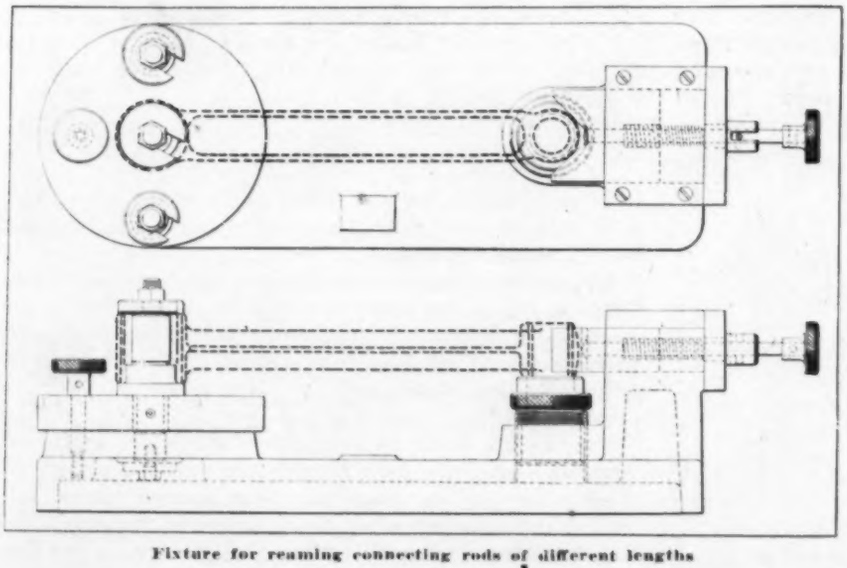
By H. W. Morgan

In the illustration is shown a fixture in which the connecting rods of radial engines are reamed. As shown, the various locating parts of the fixture are in position for reaming rods of a certain length.

The fixture consists of a base, on one end of which is a swiveling plate carrying three locating studs, and on the other end a small jack and a spring-operated V-block. In operation, the V-block is pulled back against spring pressure by the knob at the right and is locked in position by giving the knob a quarter-turn in either direction. With the V-block in this position, one end of the rod is put over the stud in the center of the swiveling plate, on which stud there is a bushing of a size to fill the rough-bored diameter of the bearing.

The other end of the rod rests on the hollow plunger of the jack and is centered sidewise by bringing the V-block against it. In this position it is reamed, the hollow plunger of the jack acting as a guide bushing for the pilot on the reamer bar. For reaming the other end, the position of the rod is reversed, the end just reamed being put over the stud, the diameter of which fits the reamed hole. The end to be reamed rests on the plunger of the jack and the V-block is brought against it, as before. Since the center distance of the stud and the hole in the plunger of the jack is fixed, the center distance of the bearing of all rods reamed on the fixture must be the same.

For reaming other rods of different lengths, two other studs are attached to the swiveling plate, as can be seen in the plan at the upper part of the drawing. The plate can be rotated to bring these into position.

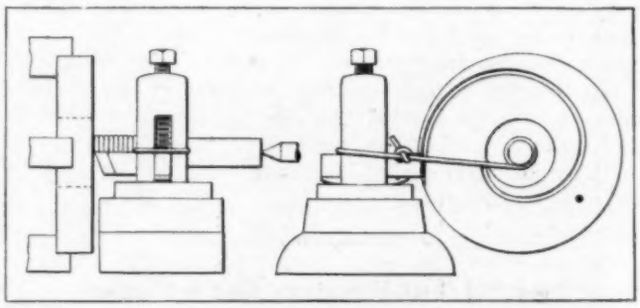


Fixture for reaming connecting rods of different lengths

Cutting Spiral Grooves in Thrust Washers

By H. Moore

A small shop confronted with the job of cutting spiral grooves in a batch of thrust washers, devised the means indicated in the illustration. With a washer held in the lathe chuck, a mandrel between the centers had several turns of small wire rope wound around it, the free end being secured to the toolpost. The cross-feed screw was removed and the necessary feeding was done by means



Device for cutting spiral grooves in thrust washers

of the compound rest. The grooving tool was L-shaped so that the point could cut close to the hole in the washer without the toolpost interfering with the mandrel.

In operation, the lathe spindle was revolved by hand by pulling on the belt, and the winding of the wire rope on the mandrel pulled the toolblock toward the center. Several cuts were taken, the tool being cleared between cuts by backing it out, using the compound rest. To get ready for the next cut, the spindle of the lathe is revolved in the reverse direction and the toolblock is pulled back by hand, taking up the slack of the wire rope as it is unwound from the mandrel. This is, of course, unsatisfactory for producing large quantities of grooves of this nature.

Characteristics of Materials

Some Fundamental Definitions

The following definitions, which enter into specifications and methods of testing, relate to characteristics of materials. They represent the best co-operative thought of a large number of engineers and should be helpful to users of materials in arriving at a better understanding of the materials entering into their products. The definitions are perfectly general, and apply to metals and non-metals, solids and fluids.

CONSISTENCY. Consistency is that property of a material by which it resists permanent change of shape. The term may be applied to either fluids or solids, for example, consistency of iron, clay slip, syrup or butter.

FLUID. A substance which is continuously deformed under any finite shearing stress, so long as the stress is maintained. Specifically a gas or a liquid.

SOLID. A solid is a substance which will continuously resist deformation provided that the shearing stress is below a certain value, which is called the yield value. At shearing stresses below the yield value, the deformation consists of the temporary elastic deformation and the permanent pseudo-plastic deformation.

VISCOSITY. The measure of the resistance to continuous deformation in a fluid. The property of fluids by which they resist continuous deformation, especially characteristic of thick liquids such as molasses.

PLASTICITY. A solid is plastic when it can be readily molded into a desired form. The shearing stress must of course exceed the yield value, and liquids do not exhibit plasticity because they do not retain their shape and therefore cannot be molded advantageously. Plasticity is that property of a solid by virtue of which it not only resists permanent change of shape but it resists relatively more and more as the shearing stress is lowered.

YIELD VALUE. The minimum shearing stress required to produce continuous deformation in a solid.

ELASTICITY. When substances have been compressed they tend to recover their volume as soon as the compression is removed. All fluids have perfect elasticity of volume. Elasticity of shape refers to spontaneous return of a substance after deformation to its former shape. The term is used in two distinct senses. According to one, a substance is highly elastic which is easily deformed and quickly recovers. According to the second usage, that substance is the most elastic which most nearly recovers its shape after deformation. Elasticity should be measured according to the first definition, and the lack of perfect recovery used to calculate the plasticity.

COHESION. The force, molecular in origin and perhaps the resultant of the attractions and repulsions between the electrical charges, which causes the particles of a substance to attract each other.

STRENGTH. The maximum stress required to overcome the cohesion of a material. It is a complex property made up of tensile and shearing strength.

TOUGHNESS. The ability to withstand large and sustained shearing stresses without yielding.

HARDNESS. A property applied to solids and very viscous liquids to indicate solidity and firmness in substance or outline. A hard substance does not readily receive an indentation or impression. It is unyielding to a bruising, cutting or penetrating instrument. In viscous liquids the hardness is most appropriately measured by the viscosity, but the hardness of solids must be measured by the two properties of yield value and mobility and there must be different kinds of hardness. Since very viscous liquids like pitch with complete absence of yield value and low tensile strength may yet possess a certain form of hardness, it seems reasonable to assume that a low mobility is essential and distinguishes hardness from toughness; since a tough substance may be deformed whereas a merely hard substance may or may not. Rigidity is sometimes regarded as a form of elastic hardness.

TEMPER. To reduce or bring to a desired consistency, plasticity, softness or tractability, as by adding solvent, dispersing agent, deflocculating agent, by stirring, mixing, kneading, pugging or grinding. The hardness of steel is tempered by heating.

BRITTLENESS. The liability to break without appreciable deformation. Opposed to toughness. A material only exhibits brittleness as the shearing stress exceeds the cohesion of the material. A brittle material may be either solid or liquid but it has low cohesion and low mobility.

DUCTILITY. The capacity for deformation or extension without rupture by drawing or other process involving tension. A property of low yield value, low mobility with adequate cohesion.

MALLEABILITY. The capacity for undergoing compressive deformation without rupture as in hammering or rolling.

RIGIDITY. The property of bodies by which they resist an instantaneous change of shape. The reciprocal of elasticity.

WORKABILITY. Certain substances change in consistency during the period of application or of manufacture; for example, plaster suffers an increase in consistency as it is being applied to the walls, due to water absorption. A material shows the property of workability which is readily manageable during the operations in question.

Abstract of paper by Eugene C. Bingham, professor of Chemistry, Lafayette College, before the American Society for Testing Materials, June 1929.

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President Hoover's Move Toward Peace

THOSE who believe that the Kellogg anti-war treaties are more than an idle gesture will welcome the appointment by President Hoover of a commission to cut the military budget, now more than three times what it was in prewar days. The President points out that at the present rate of increase we shall be spending over $800,000,000 for Army and Navy by 1933, not counting pensions, veterans' relief, or other auxiliary expenses.

The President has imposed no easy task on the officers who make up the commission. It requires men of extremely large caliber to see the possibilities of curtailing expenditures on projects to which they have devoted their life work. But the fact that President Hoover has chosen such men is evidence of his faith in their ability to measure up to his ideas of curtailment, which is in itself no small compliment. No single act that President Hoover may perform during his term of office will have greater significance of his faith in the future than his endeavor to have this country do its share in reducing the staggering sums now being spent for military purposes. President Hoover points the way toward better world relations through indorsing the Kellogg treaties in the most effective way possible.

*

Unwise Standardization and Specifications

STANDARDIZATION with all its possible advantages can be so misused as to be a positive detriment to all concerned. For, like nearly all other factors that enter into business, it must be used intelligently to be really beneficial. The difficulty in many cases arises from the effort to standardize too many items and to specify details instead of the few important points that vitally affect results.

This tendency to standardize details prevails to a large extent in Army, Navy and other governmental specifications. The same tendency is, however, noticeable in the conduct of some very large private concerns, and is equally detrimental in all cases.

A recent case in which a large private concern was involved points out the disadvantages of the practice. The company in question notified the builders of certain machines that it had standardized on one of its machines, and that in future all machines must be like the last lot received. It so happened that the next lot of machines came through with an improved design in some of the essential details, but the changes were not apparent from the outside. If the builders followed specifications to the letter they must continue building a unit that had been discarded for a better one. If they sent the new machine it might be rejected as not being standard.

There are many advantages in standardized parts that affect either work or tool-holding devices. But it is seldom wise to specify details as standard because they have been found satisfactory in the past. Such standardization frequently prevents the vendor from supplying the latest and presumably the best machine or device available, and so defeats its object. The more we demand results and the less we specify details, the better it will be for all concerned.

*

Mechanical Materials Handling Reduces Foundry Accidents

HANDLING material by hand methods not only wastes time but is conducive to accidents, according to a recent report issued by the Metropolitan Life Insurance Company. Although this report deals specifically with accidents in foundries, it is quite probable that a similar condition exists in other departments. Among the causes of accidents, the use of manual handling methods heads the list with 29.5 per cent, higher than the result of hot or corrosive substances that follows a close second.

Accidents from cranes and derricks are only 8.2 per cent, while hand trucks cause 4.2 per cent of the casualties. These figures indicate that, under average conditions, mechanical handling apparatus greatly reduces the number of accidents in a plant. Added to the economy of handling, the safety factor makes it imperative that careful attention be given to this phase of plant operation. The total number of such accidents is less than half those where no mechanical appliances are used.

SHOP EQUIPMENT NEWS

"M.C.E." Centrifugal Babbitting Machines

CENTRIFUGAL babbitting machines in three sizes, 8-, 12-, and 18-in., have been developed and placed on the market by the Manufacturers' Consulting Engineers, 487 S. Salina St., Syracuse, N. Y. Front and rear views of the 18-in. machine are illustrated in Figs. 1 and 2, respectively. The capacities as listed above are for 8-, 12-, and 18-in. connecting rods, respectively.

The motor is built-in and is accessible through a large opening in the back of the base. Ball bearings are used on the spindle pulley and belt tension is maintained by a spring-type, roller-bearing idler pulley. A cone-type clutch drives the spindle, which is stopped by disengaging the clutch from the spindle pulley and engaging the other side of the clutch with a stationary brake drum. The spindle is mounted on ball bearings and carries the aluminum faceplate. Aluminum is used for this part to reduce starting and stopping loads. Air is run through the bearing being cast by means of a fan mounted on the back of the faceplate, and the time required to cool the bearing metal is thus reduced materially.

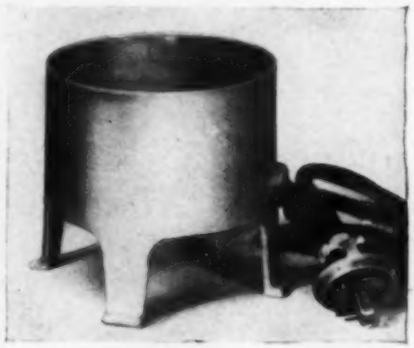
The clutch is thrown from the driving to the breaking position by the vertical lever and the fixture clamp plate is opened or closed by the horizontal lever. Both levers stay in the position set.

Fixtures are generally made up of a wrist pin stud and two die plates. One die plate has locating points for the crankshaft end of the rod and is mounted in the faceplate. The other die plate is mounted in the clamp plate. The connecting rod is clamped in place by three springs mounted on the clamp-plate guide rods. The approximate net weights of the 8-, 12-, and 18-in. sizes are 910, 970, and 1,140 lb., respectively. The floor space occupied by the models is 30 x 30 in., 30 x 36 in., and 30 x 48 inches.

Fig. 1—Front view of the "M.C.E." Centrifugal Babbitting Machine
Fig. 2—Rear view of the same unit

Trent Tinning Pot

Made only in the single-heat type for 110-volt circuits, the tinning pot illustrated has been placed on the market by the Harold E. Trent Company,

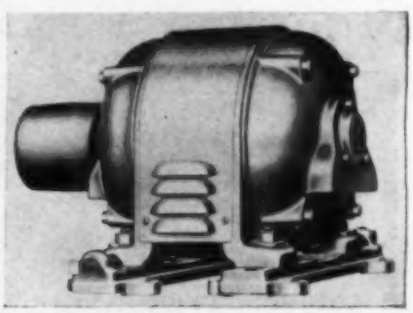


Trent Small Electric Tinning Pot

439 North 12th St., Philadelphia, Pa. The pot consumes 355 watts. The inside dimensions are 4 in. in diameter by ½ in. deep. The manufacturer is in a position to supply this pot with a depth of only ⅛ in., if desired.

U. S. Electrical Manufacturing Company's "Uniclosed" Motors

Although not totally inclosed, the "Uniclosed" motor is provided with a pressed steel housing, embodies a dual fan blast, operates on the "AutoStart" principle, and has a solid die-cast aluminum rotor and ball bearings. It has been placed on the market by the U. S. Electrical



"Uniclosed" Motor offered by the U. S. Electrical Manufacturing Company

Manufacturing Company, Los Angeles, Calif. It is offered for installations that require protective closed-frame motors.

Protection is provided for moving parts and for the electrical windings. Ventilation is furnished by the employment of a dual fan blast and

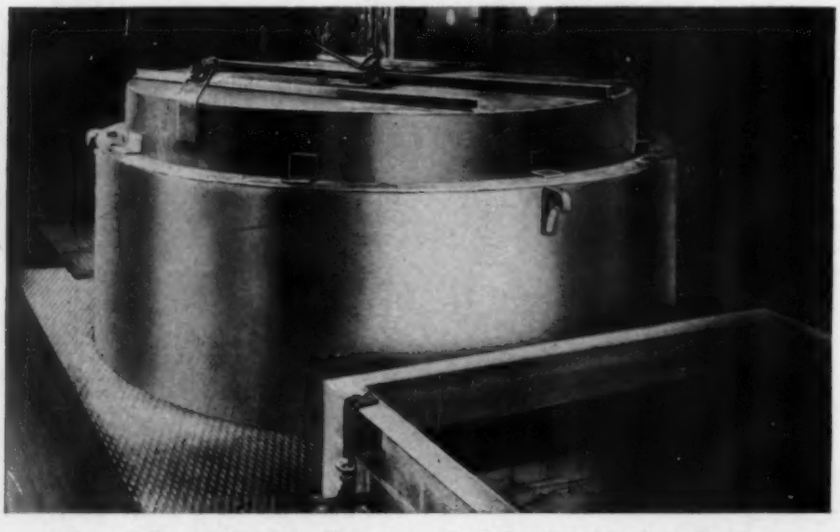
dual exhausts. Two air streams are drawn through the motor by high capacity fans located on opposite sides of the rotor. Each fan creates separate air currents which meet at the middle of the frame where the heated air is expelled directly on both sides of the motor through the dual exhaust louvres. A feature of the design is the cover. It can be removed quickly by loosening four screws. This exposes the air passages for inspection and cleaning. There is no direct exposure of the windings. The internal parts are shielded from water and dust.

General Electric Furnace for Heat-Treating Aluminum Castings

THE General Electric Company, Schenectady, N. Y., announces an electric furnace especially designed to heat-treat aluminum alloys. The furnace is a pit-type, cylindrical unit having two circuits: one, rated 220 volts, 3 phase with a Y-series connection, is in the top; the other, in the lower side walls and bottom, is rated 220 volts, 3 phase with a Y-delta connection. At high heat the power consumption is 84 kw. and at low heat, 28 kilowatts.

In a typical application of this furnace a run of castings weighing approximately 500 lb. plus a basket weight of 700 lb., both at room temperature, was placed in the furnace at a temperature of 960 deg. F. In 1½ hours the center of the charge was at the heat-treating temperature, although for a third of this time the furnace was operating on low heat. A check showed that the outside of the charge next to the heating units was no higher than 960 deg. Fahrenheit.

In this typical furnace, the working dimensions were a diameter of 4 ft. and a depth of 6 ft. It was designed to heat a charge weighing 1,500 pounds plus a basket weight of 500 lb. from 600 to 950 deg. F. in one hour, and to hold the charge at the latter temperature for 12 hours. The estimated radiation at the holding temperature is 17 kilowatt-hours per hour.



General Electric Pit-Type Furnace for Heat-Treating Aluminum Castings

Losenhausenwerk Portable Ball-Testing Apparatus

Portability is the chief feature of the hand-type ball testing apparatus manufactured by the Losenhausenwerk Dusseldorfer Maschinenbau A. G., Dusseldorf-Grafenburg, Germany, and marketed in the United States by Alfred Suter, 200 5th Ave., New York, N. Y. The instrument is operated by hydraulic means and is accurate to plus or minus 1 per cent, according to the manufacturer. Its open design makes it possible to arrange the tester for many uses.

Losenhausenwerk Portable Ball Testing Apparatus shown in use at a stock rack

For example, models are available for testing, respectively, thin sheets, railway material, inner cylindrical surfaces, and shafts. All models can be carried to the work.

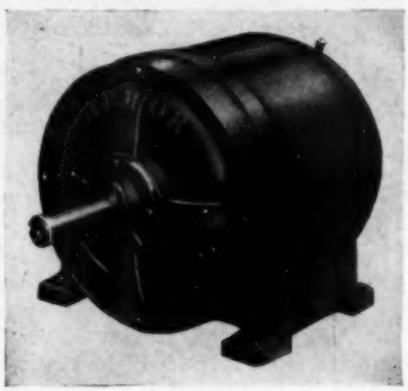
The testing height can be adjusted from zero to the maximum obtainable. In the case of the tester indicated, the maximum testing height is 4 in. A small crank serves for producing the load, which is indicated on a small manometer that can be read directly in pounds. The standard unit is built for 1,650 and 6,600-lb. pressures, but special models with the testing height and the gap measurement conforming to the customer's requirements can be built.

The main body of the tester is made of a special light alloy. All bright parts are nickeled, while other parts are enameled. The standard 1,650-lb. range tester weighs 16.5 lb., and the 6,600-lb. range instrument, 55 pounds.

Armor Type C Totally-Inclosed Fan-Cooled Motors

Heavy cast-iron end brackets are featured in the Type C totally-inclosed, fan-cooled polyphase motors offered by the Armor Electric Manufacturing Company, Erie, Pa. These brackets are designed to offer a maximum of protection against the entrance of explosive gases and abrasive substances into the motor and increase radiation of heat by means of heavy ribs, which carry the heat from the brackets to the outside

rings. The fan has a substantial hub keyseated to the shaft, and is held by a nut. The caps, which hold the adjustable Timken bearings, have fine grooves on the inside to supply grease. This construction provides a dirt and gasproof seal for the bearings. Provisions are made for taking air gap measurements at four points. Means are also provided for removing an accumulation of dirt from the interior



Armor Type C Totally-Inclosed Fan-Cooled Motor

of the motor without tearing it down.

The Type C motor is built in sizes up to 50 hp. The temperature on a continuous full load will not exceed 55 deg. All windings and bearings are totally-inclosed within ¼- to ½-in. cast-iron coverings.

"Rotor" Die Grinder

Designed to use 1½-in. vitrified wheels, 2½-in. high-speed wheels, and ½-in. pencils, a die grinding tool has been announced by the Rotor Air Tool Company, Cleveland, Ohio. This tool is designed for use on dies, metal patterns, and also for work in brass, bronze, and aluminum foundries for the finish grinding of castings and for scroll work on ornamental pieces. The tool develops ½ hp. at 13,000 r.p.m. This speed gives smooth, clean work with small wheels and points.

The cross-section in Fig. 2 shows the simple design of the machine, which weighs only 4 lb. The standard equipment includes a wheel arbor for wheels with a ⅜-in. hole and ⅜ in. in width, but on special order arbors are furnished for ¼- and ½-in. holes. A full line of accessory

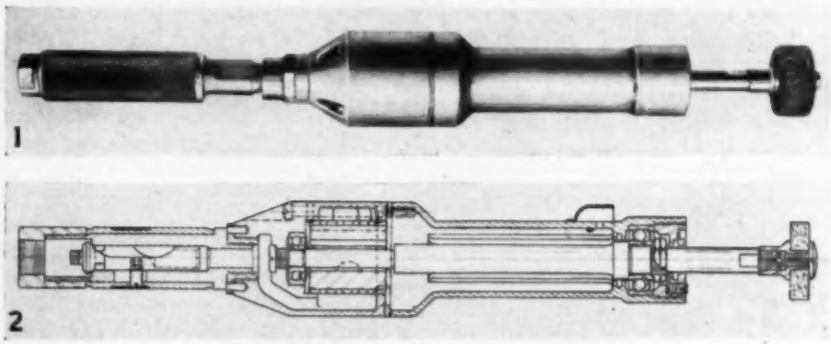


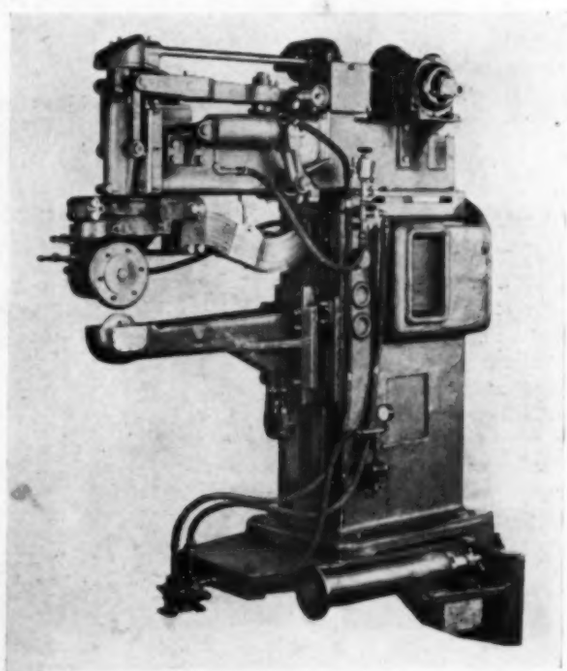
Fig. 1—"Rotor" Die Grinder, which is designed for 1½-in. vitrified wheels, 2½-in. high-speed wheels, and ½-in. pencils. Fig. 2—Cross-section of the "Rotor" Die Grinder

equipment is offered, including a collet for holding ¼-in. shanks for mounting small wheels and for holding pencil sticks with ¼-in. shanks. The same collet may be used to hold points with different mountings in order to use the tool for a great variety of special work.

Thomson Model 375 Heavy-Duty Double-Roller Seam Welder

BOTH longitudinal and circumferential seam welds may be made up to 30-in. lengths on the model 375, heavy-duty, double-roller seam welder by merely interchanging the lower horns. The unit has been placed on the market by the Thomson Electric Welding Company, Lynn, Mass. The above feature is obtained by the construction of the upper roller shaft bearing housing and mounting, which may be rotated through 90 deg. without displacing or breaking an electrical joint. The same type of roller mounting is used on the lower horn. Both flat and cylindrical work in gages up to No. 14 may be handled.

The machine may be supplied with a transformer rated at 100, 150, or 175 kva. Drive of the upper roller electrode is through motor, gear-reduction unit, and gears with provision for altering the speed of the upper roller through the operation of change gears. The pressure on the work of electrodes is obtained through an air cylinder operating through an adjustable pressure spring. Turning on and off of the welding current is controlled automatically through the pressure cylinder. The initial air line pressure may be controlled easily



Thomson Model 375 Heavy-Duty Double-Roller Seam Welder

through an adjustable relief valve. The cylinder itself is controlled of course through a foot valve. One of the features of the machine is the mounting of the upper roller which is of the offset or open-side type, which permits quick replacement of the roller electrode. The roller is of the forged ring type and is mounted on a large hub on the rotating shaft. This shaft and the bearing housing are water cooled.

General Electric Conveyor-Type Small Parts Heat-Treating Furnace

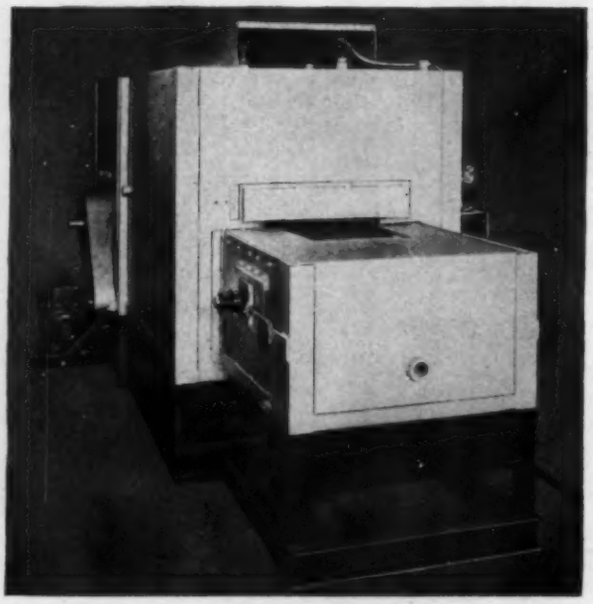
A conveyor-type electric furnace for heat-treating small parts has been announced by the General Electric Company, Schenectady, N. Y., the use of which is claimed to result in material savings in labor involved for this process. It is of the mesh-belt conveyor type, and the automatic feed and discharge effects the labor savings.

The furnace is of rectangular form, about 8 ft. long, 4 ft. wide, and 4½ ft. high, over-all. A small insulated housing is provided for the feed end of the belt to prevent unnecessary heat losses. The moving parts and terminals outside the furnace are adequately protected by special safety guards.

The principal feature of the furnace is the mesh-belt conveyor, made of heat-resisting alloy. The driving mechanism is so designed that slack is taken up automatically when the belt is hot. The mesh belt is carried over two drums of the heat-resisting alloy, one of which is driven by a motor through a suitable gear reduction and speed transmission.

The furnace can be adjusted for various speeds and temperatures, and an adjustable opening at the feed end accommodates work of different dimensions. After heat-treating the work is discharged into a chute, which may carry it to a box, quenching bath, or some other subsequent process. By suitable distribution of the heating units, uniform heating is maintained throughout the entire cycle, and the automatic control will maintain a constant temperature within from 5 to 10 deg. Fahrenheit. This is necessary in order to assure uniform quality on mass production.

To start the furnace in operation it is only necessary to set the control for the desired temperature, adjust the speed and feed work to the belt. The furnace will handle up to 300 lb. per hour, in shapes up to 16 by 2½ in. over-all. The resistors are easily removable through the sides or top as required.



General Electric Conveyor-Type Small Parts Heat-Treating Furnace

"Rite Speed" Polishing and Buffing Lathe

Marketed under the trade name of "Rite Speed," an electric polishing and buffing lathe employing a V-type belt drive has been placed on the market by the Hill-Curtis Company, Kalamazoo, Mich. The machine is furnished in the style shown in the illustration and also with the overhanging type of spindle. The motor is located in a pedestal base. Adjustment for taking up slack in the V-belts is made from the outside of the machine without disturbing the motor mounting, thus preventing the possibility of getting the pulleys out of alignment. This adjustment is simple and can be made by the operator. Timken tapered roller bearings or ball bearings may be furnished on the spindle as desired. An automatic motor starter with overload protection is standard equipment.

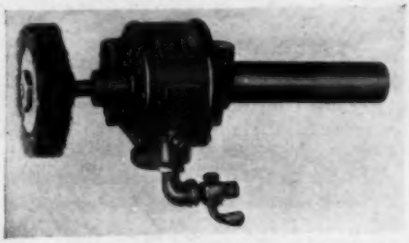
Hill-Curtis "Rite Speed" Polishing and Buffing Lathe

The combination switch and brake is a feature. To apply the brake it is necessary only to pull the lever forward in order to break the current connection and cause the brake to operate. The brake is released and the motor started by reversing the lever movement.

Removal of the belt may be accomplished easily by taking out the four large capscrews on each side of the spindle, after which the entire spindle can be removed from the pedestal without disturbing the bearing mountings. The motor adjustment screw is then loosened, thereby taking the tension off the motor pulley and the belt is slipped off the spindle.

Paasche Air Motor Cleaner

For removing rust, scale, and loose paint from surfaces preparatory to painting, an air motor cleaner has been placed on the market by the Paasche Airbrush Company, 1909 Diversey Parkway, Chicago, Ill. It is for use with portable airpainting equipments and it is claimed that the rotary steel wire brush will effect considerable savings in time and labor. The device may be attached to any air supply and operated at a slow or fast speed by regulating an

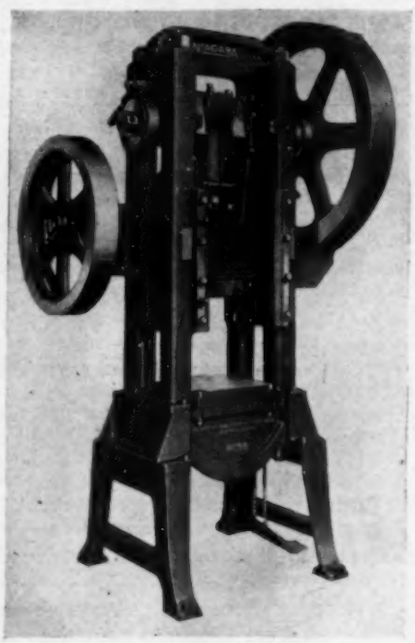


Paasche Air Motor Cleaner

air valve. The unit uses a 4 by $\frac{3}{4}$-in. wire brush or a 6 by 1-in. brush. The net weight is 10 lb. and the unit is 11 in. long by $4\frac{1}{2}$ in. in diameter.

Niagara Nos. 54 and 56 Single-Crank Power Presses

To meet the present demand for a small size press having great rigidity and strength, the Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y., has placed on the market the Nos. 54 and 56 single-crank power presses of the four-piece steel tierod frame construction. These presses can be furnished in belt- or motor-driven types in either plain or single backgeared models. The presses are adapted to the manufacture of watch and clock parts, small automobile hardware, radio and electrical parts, small armature blankings, and similar articles.



Niagara Single-Crank Power Press

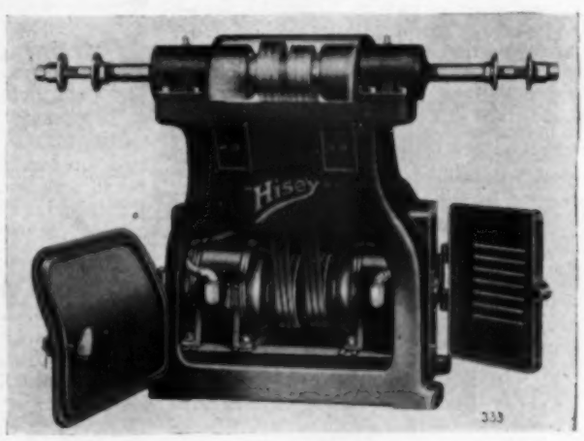
The presses have a rated capacity of 32 and 56 tons, respectively, and are therefore suitable for the lighter drawing operations. Strip stock of considerable width can be fed from right to left through the openings in the uprights. The correct working height of the bed has been provided, and plenty of leg room also.

Hisey-Wolf Dual-Motor Texdrive Buffer

Two separate spindles, each operated by its own motor, are employed in the "Texdrive" buffer manufactured by the Hisey-Wolf Machine Company, Cincinnati, Ohio. Each motor has its own starter, and can be started or stopped at will. This arrangement makes it possible to have two spindles operating at different speeds at the same time, thus permitting two types of work to be done. The machine is of the gooseneck design, which gives the operator greater freedom of movement and permits easier handling of large and bulky pieces. Accessibility of all parts and rigidity of construction are incorporated in the buffer.

The base consists of a heavy casting, inside of which are mounted the motor, starter, and starting switch. The spindle and bearing housings are assembled as a unit. This unit may be quickly removed from the base by loosening four bolts. The motor is mounted on a cast-iron subbase, which is securely bolted to the main frame. This arrangement permits easy adjustment of the motor forward or backward to secure proper belt tension. Changing the belt is a simple operation, because the unit head eliminates the necessity for removing the spindle from the bearing housing.

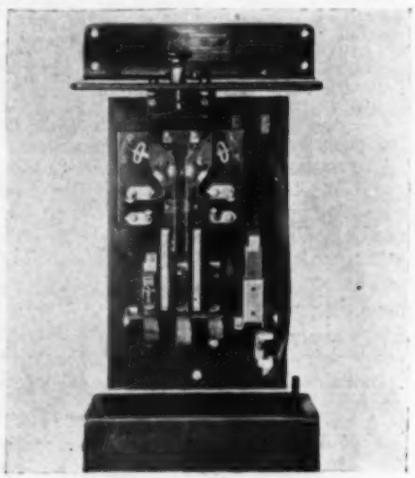
The wide range of motor adjustment makes it possible to secure the required spindle speed over a wide range. Automatic lubrication is obtained by a simplified oiling system. Oil chambers in the bearing housing are filled through conveniently-located cups. The spindle is of extra large diameter, and is made of nickel steel, balanced to prevent vibration.



Hisey-Wolf Dual-Motor Texdrive Buffer

General Electric Small-Capacity Oil-Immersed Magnetic Switch

The General Electric Company announces an oil-immersed magnetic switch of small capacity. This device is particularly suitable for use in gaseous atmospheres where highly corrosive gases or acids are encountered. It bears the designation CR-7006-V-7. The switch has a capacity of 40 amp. and can be used with any motor, from 110 to 600 volts, the full-load current of which does not exceed this value. The



General Electric Small-Capacity Oil-Immersed Magnetic Switch

contactor and interlock are standard in design. The overload relay used has oil-immersed contact tips, in which the heaters are located above the oil level in the tank.

The inclosing tank is ¼-in. sheet metal with a flange for wall mounting. The tank is provided with a felt gasket to prevent the entry of dust which would contaminate the oil.

REVIEW · OF · RECENT · PATENTS

Relating to the Machinery and Metal Products Industries

Metal-Working Machinery

A machine with grinding means defining a plurality of passages, and feeding means for passing parts through the passages, is covered by patent 1,719,964, granted to Paul Bruhl, of Dusseldorf, Germany. To the same individual is granted patent 1,719,965 for another machine having a pair of grinding plates each defining a part of a passage, means for feeding blanks through said passage, and means for moving said plates apart or together.

Theodore P. Caulkins, of Chicago, Ill., has been allowed patent 1,720,033 on a bolt drilling machine having novel automatic means for feeding bolts successively into position, and drilling same while they are held securely.

The Lees-Bradner Co. is assignee of patent 1,720,404, dealing with a grinding machine which has a base, a carriage with a spindle, a blank on the spindle, and means for turning the blank when the carriage is moved.

Patent 1,720,570, granted to Richard H. Pratt, of Pelham Manor, N. Y., covers a spot-welder with means for clamping the electrode on the work, and for vibrating them to create frictional movement between superposed parts of the work, thereby removing paint or other resisting matter from contacting surfaces.

The Kearney & Trecker Corporation is assignee of patent 1,720,734, which relates to a machine tool structure having a novel method of controlling the belt drive from an external source.

Sven G. Bolin, of Kansas City, Mo., is patentee of a boring machine (patent 1,721,268) which comprises a pair of heads, a pair of spindles and a pair of chucks, combined with other parts in novel fashion.

Patent 1,721,429, granted to Alfred N. Bourman, of Oxford, Ohio, relates to a power hammer having a new arrangement of columns and bracing for support of the hammer and anvil.

A milling machine for connecting-rod straps is the subject of patent 1,721,579 granted to Arthur W. Waltemath, of East Chicago, Ind. It covers the combination of an adjustable supporting frame, a carriage for the cutter and means for moving it bodily in vertical, circular and horizontal directions.

Three patents, 1,721,623, 1,721,636 and 1,721,810, assigned to the Delco-Remy Corporation, cover novel machines and methods for forming armature conductors, especially hairpin windings and open-loop or single-turn conductors.

Patent 1,721,671, assigned to the Imerman Screw Products Co., deals with a cutting-off machine having a work holder, tool holders at opposite sides of the work, and means for moving the tool holders towards the work.

To Cincinnati Grinders Incorporated is assigned patent 1,722,386, relating to a centerless grinder having a work support arranged to feed the work into contact with the grinding wheel, hold it during the grinding operation, and thereafter withdraw it from the wheel.

Patent 1,722,691, assigned to the Van Norman Machine Tool Co., relates to a grinding machine with an oscillating work head having a belt pulley for rotating with the work.

TRADE PUBLICATIONS

MILLING CUTTERS. The Thurston Manufacturing Co., Providence, R. I., has published catalog G on "Thurco" milling cutters, saws, and die milling machines. Each product is illustrated and the available sizes are listed. The machines are thoroughly described. Engineering data are included. The catalog contains 82, 9 x 6-in. pages.

MOTORS. The Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo., has published bulletin No. 159 on large vertical motors, which may be obtained in single-phase, repulsion-induction and polyphase, squirrel-cage types. The bulletin gives the features of construction, including the bearing mountings. It contains four 11 x 8½-in. pages.

"OAKITE." The Oakley Chemical Co., 22 Thames St., New York, N. Y., has published bulletins as follows: "Modern Cutting and Grinding," "Modern Metal Cleaning," and "Oakite for Automobile Truck-Tractor and Airplane Manufacturers." Each of these bulletins gives the qualities of Oakite and general directions for use, and processes for specific operations such as pickling. Each catalog is well illustrated throughout.

"RUST-OY," RUST-RESISTING COMPOUND. The Williams Alloy Products Co., Elyria, Ohio, has published a bulletin showing the rust-prevention qualities of "Rust-Oy," a compound which may be used on new, slightly-rusted, and badly-rusted steel. The bulletin is illustrated.

SMALL TOOLS. The Western Tool & Manufacturing Co., Springfield, Ohio, has published catalog No. 19 illustrating and describing expanding mandrels, toolholders, lathe dogs, C clamps, shop furniture, emery wheel dressers, and vises, and other products. Each item is illustrated and available sizes are listed. The catalog contains 96, 9 x 5-in. pages.

SPRAYING EQUIPMENT. The Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill., has published bulletin No. 12 illustrating the uses of Binks sprayers for water base paints, calsomines, whitewash, and insecticides. The spraying equipment is illustrated.

TOOLS, NON-SPARKING. The American Metal Products Co., Thirty-fourth Ave., Burnham St., Milwaukee, Wis., has issued a catalog entitled "Ampco Non-Sparking Tools" showing various types of hammers, pliers, wrenches, screw drivers and other tools. The catalog contains twelve, 11½ x 8-in. pages.

TWIST DRILLS. The New Process Twist Drill Co., Taunton, Mass., has published catalog No. 28 on hot-forged twist drills. Other products are high-speed flat track bits, three- or four-fluted drills, and drills for ratchets and hand braces. Each product is accompanied by a table of sizes. The catalog contains twenty, 9 x 6-in. pages.

BUSINESS RESEARCH SUMMARY. The Metropolitan Life Insurance Co., Policyholders Service Bureau, 1 Madison Ave., New York City, has published a summary on "Better Business Through Research in New England Industry." It summarizes briefly the object of the research survey made recently.

TRENTON MANUFACTURERS. The Trenton Chamber of Comerce has compiled a listing of manufacturers and their products for Trenton, N. J. The listing consists of twenty-six, 11 x 8½-in. pages.

NEWS
OF THE WEEK

Labor Shortage Affects French Industry

France Clears the Decks and Prepares for Campaign of Industrial Progress

By Our Paris Correspondent

A FRENCH economist has given the first publicly-broadcasted echo of what most of the French technical world knows: "France with a shortage of man-power must of necessity head towards a highly-accentuated machanism." The observation is flowery after the French manner, but those who would lead French industrialism to a progressive prosperity now appear to accept it.

On June 30, there were listed by the government labor bureau at Paris 2,810 demands for specialized labor in the metal and machinery trades which could not be satisfied. The shortage occurs particularly in the Lyons and Saint Etienne district. In the Metz and Nancy region, the divergence is even more remarkable. Belfort shows a shortage to fill existing demands, as well as the Department of the Haut-Rhin and Meurthe et Moselle, all in the east of France. There is a considerable recruiting of female labor in the metal trades to an extent not known since the war. Man power has left the countryside for the towns to an alarming degree. Women and girls operating automatic and semi-automatic machine tools in the metal-transforming trades suggest a possibility of increase in women employed in many plants handling small units of work where they have proven themselves worthwhile.

Living costs for the last quarter rose 9 points as compared with those of the previous three months, an increase of 25 points over January. Wholesale prices have dropped 13 points in the last quarter. This is helping the fabricator and distributor in many lines, but none of the benefits seem to have reached the consumer yet.

Comment is made in many manufacturing circles that wholesale prices have dropped in Germany also. This leaves the situation, so far as production costs are concerned, where it stood before. The French market is thus ever open to German competition for the reparations account. It is believed, however, that the later workings of the Young plan will reduce the volume of payments which will be made by Germany in kind in favor of payments in cash.

Building construction in France has never been so active since the war. The automobile industry shows no unseasonable contraction as yet and agricultural machinery makers, locomotive and rolling-stock plants, and shipyards show activity, even if, as is claimed by many of the bigger units, it results only too often in a fictitious prosperity. Labor, at any rate, is getting its part though it grumbles, and with some reason, at the disproportionate relation between the contents of the pay envelope and those of the provision basket.

There are no manifest declines indicating a falling off in future output of consumer goods, except those manufactured for export where business is still intangible as a result of competition in world markets, at the moment specifically that of Germany in many lines. The most recent invasion of German imports is that of cutlery, which in this particular instance, is classed in the French report as all "cutting tools for wood or metal, including tableware." The subject is a large one in its scope and the table cutlery makers of Thiers and Chatellrault on one hand and the makers of chisels, drills, and planes on the other, as well as British importers of Thiers, are already beginning to feel the effects in this market. Sheffield is giving way to Solingen. German bolts, nuts, rivets, chains, tubing, and plumbing supplies are giving French exporters to the markets of the Near East much concern. It is in that region where, since the war, French trade volume has increased. Not cheap labor or long hours alone appear to be the cause of the increase, but more efficient production, better methods of distribution, and more extended credits.

The automobile industry, so far as new equipment is concerned, is influenced at the moment by expectations of what the future will bring forth. The French saturation point is believed to be far distant, actually a million units away. At the present annual rate of production this presents a five year's job.

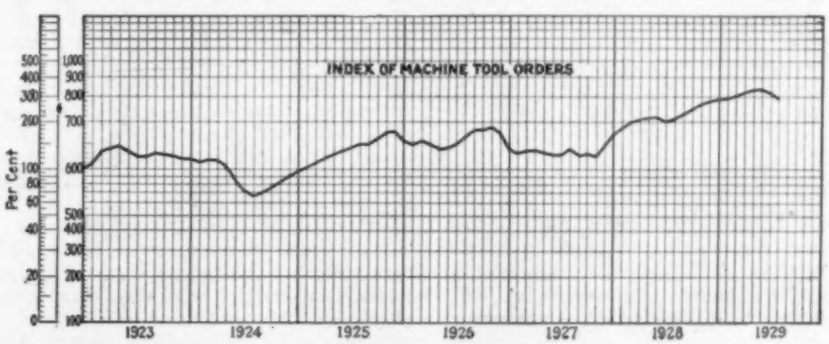
Automobile exports increased 3,150 units in the first five months of the year over the same period in 1928, but show a falling off of almost a like figure over the totals of 1926 and 1927. Imports have increased over 1928 by 400 units, chiefly from the United States and Italy.

As has been mentioned, there is a growing demand for small electrically-actioned tools and machines. The small shop in the provinces is equipping itself after a manner never known before, which suggest the ultimate taking on of even more ambitious equipment. Borers, grinders, hammers, riveters, and screwing devices are in demand. The American product has shown a falling off in numbers in recent years, imports from Germany have increased, and French makers have entered the field, the latter on a universal breast drill which actually copies a well-known American make. The German product appears to have a price advantage only.

* * * *

July Machinery Business Affected By Belated Summer Decline

THIS year, the machine-tool industry almost escaped the summer decline which in other years has lasted from May to August, according to Ernest F. DuBrul, general manager of the National Machine Tool Builders' Association, and perhaps for the very reason that the decline was postponed a full two months, the July volume was somewhat lower than it might have been. A precipitate decline for July still leaves the level of orders relatively



high, in fact, 27 per cent higher than that of last year, and 40 per cent higher considering the three-month average. Shipments are being maintained at a high level established last spring, and there has been no let-up in plant activity over the summer.

An action regarded by some as an indication of credit strain within the United States is the raising of the rediscount rates to 6 per cent by the Federal Reserve Board. It is expected that the effect of the higher rate will be to stabilize money rates somewhat, and at a lower level for all classes of borrowers, than has been the case for some months past.

Prices for iron and steel are at a comparatively low level, but there is no indication that they will continue to remain there if the present demand continues, or if fall activity pushes up the demand.

Skilled labor is fully employed, trained workers are in demand, and some bidding up of wages is a very natural consequence. The fuel situation is unchanged. A possible car shortage is in the offing early this fall when crop moving is at its height. At the present time, car loadings are being maintained at a level about 10 per cent over the three-year average, and the peak of the loadings does not come until October. As a result, the railroads may have difficulty moving with dispatch all the freight offered them for transport at that time.

The keen interest being shown in the coming Machine Tool Show in Cleveland is taken as an indication that users of equipment have by no means replaced all of their machines that need replacing, nor have they increased their facilities to the extent required by the heavy demands made upon them for production. Executives of these concerns are looking forward to the Show as an opportunity to gather new ideas and fresh solutions of their production problems.

The level in machine-tool buying is still maintained above the level of the summer of 1928 for the industry as a whole. Shipments fell off from their five-month average around the 300 mark on the index to 278.1, probably as a result of the vacation season. This is, however, considerably above last fall's rate of 240.

* * * *

Plant Inspection Trips Featured At Cleveland Shows

MORE than 200,000 sq.ft. of space will be taken by airplane manufacturers, dealers, and distributors at the 1929 National Aeronautical Exposition to be held in Cleveland from Aug. 24 to Sept. 2. The exhibition will be held in the Cleveland civic buildings. The Cleveland Aeronautic Meeting of the S.A.E. and the Aeronautical Chamber of Commerce of America will be held in connection with the exhibit at the Hotel Statler from Aug. 26 to 28. The program includes standards, propellor, power plant, airplane-design, technical, and a light-alloys session, with an aeronautic dinner and session at the Hotel Cleveland on Tuesday evening, Aug. 27. There is also an inspection trip to the Goodyear-Zeppelin plant at Akron, Ohio, scheduled. The Great Lakes Aeronautic Meeting and Engineers' Aviation Day will be held on Saturday, Aug. 31, at the Cleveland municipal airport, at which all types of airplanes, including the autogyro, will be discussed and demonstrated.

A plant inspection program for the various metal manufacturing and metal working companies near Cleveland, Ohio, has been arranged for the National Metal Congress to be held in Cleveland the entire week of September 9. The schedule provides for a great majority of the plant inspections in the mornings so that the afternoons may be free to attend the National Metal Exposition, at which something over 250 exhibitors will occupy 80,000 sq.ft. of space in Cleveland's Public Auditorium. Only two afternoon inspections are scheduled, those on Tuesday and Thursday afternoons. The remainder of the schedule provides time and opportunity for the visiting of 21 companies in and about Cleveland. The Tuesday afternoon inspection will be of the Case School of Applied Science, while that of Thursday afternoon will be an inspection of Nela Park. This schedule will be a part of the program of the five major engineering and technical groups which will hold their annual meeting in Cleveland in connection with the National Metal Congress.

* * *

American Machine Shop Institute Being Formed

A new organization known as the American Machine Shop Institute is being formed by William E. Dunn, Jr., with headquarters in the Georgia Savings Bank Bldg., Atlanta, membership to be restricted to the owners and managers of machine shops and machinery manufacturing plants, the association to be national in its scope and character. The organization's purpose is for an interchange of ideas and machine shop methods, research, dissemination of cost information, and the sponsoring of the American plan of operation. Mr. Dunn has for a number of years been the executive secretary of the Southern Metal Trades Association, which also has its headquarters in Atlanta.

Many Soviet Engineers Visiting United States

A total of over 200 Soviet executives and engineers are at present in the United States on various business missions, according to the Amtorg Trading Corporation. Among the recent arrivals are B. Kuritzin, chairman of the Soviet State Machine-Building Corporation, M. Nikiforov, chairman of the rubber trust, W. S. Matlin, vice-chairman of the Electrochemical Trust, N. Levechenko, vice-chairman of the Donugal Coal Trust and 45 other Soviet executives. Some of the Soviet engineers are going to work in the larger American industrial plants to study production conditions at first hand.

* * *

General Electric Has New Insurance Plan

A revision in the group life insurance plan of the General Electric Co., whereby the premiums paid by new employes will be in accordance with their age rather than an average rate common to all employes, and a modification of the plans for free insurance and additional pensions, also equalizing benefits according to age, were announced by President Gerard Swope recently. The regular pensions given by the company are not affected by the revision. Approximately 80,000 employes are included in the group life insurance, which amounts to $160,000,000 at the present time.

* * *

American Airplane Exports Show Remarkable Increase

American exports of airplanes, engines, and parts were valued at $5,174,656 for the first six months of 1929, according to a recent report of Leighton W. Rogers, Chief of the Aeronautics Trade Division of the Department of Commerce. This figure was more than three times as great as the total for the same period of 1928, exceeding by a million and a half the total for the entire year of 1928. During the first half of the year, 199 airplanes were shipped abroad, as compared with 87 for the same period of 1928, while during the same period, 178 aircraft engines were exported, as compared with 65 for the first six months of 1928.

* * *

Airplane-Engine Testing Improved by Government

More extensive and slightly more stringent testing of airplane engines will be made possible through the laboratory set up at Arlington Farms, Va., on government land across the Potomac from Washington, where engineers of the Bureau of Standards are

running bench tests for the issuance of U. S. Department of Commerce approved type certificates. The new location is on the edge of Hoover Field. Three torque stands are in operation and a fourth is being constructed.

Since the approval work was undertaken by the Department of Commerce last March, 32 engines have been taken for testing by the Bureau of Standards. Of these, 9 passed, 15 failed, 5 were withdrawn, and 3 are now on the racks. Most of the engines submitted were the first of their kind or one of an experimental group which accounts for the comparatively high percentage of failure.

* * *

President Receives Business Paper Men

Traditions with regard to press representatives were shattered last week when President Hoover granted full recognition to accredited correspondents of business papers at White House conferences. Heretofore, business press representatives were not admitted to these conferences as business journalists, unless they were also local correspondents for daily papers. Permission has been granted largely because of the President's understanding of the importance and responsibility of business publications and the activities of the business paper organizations during the past few years. The Washington business press correspondents have formed an association that has as chairman, Paul Wooton, Washington correspondent of the *American Machinist*.

* * *

Metal-Marking Colors Announced By Government

According to an announcement by the Federal Stock Catalog Board, Federal Co-ordinating Service, a new list of color designations will be used in marking the ends of bars, billets, slabs, and ingots of metals for use by the Government. Colors are black, brown, green, lead, pink, red, white, and yellow, with various stripes to represent grades of hardness or composition in a given metal. Black will be used to represent copper and copper-steel alloys. Blue will be used to mark bronze. Nickel and carbon steels will be marked with brown, while tool steel will be marked with green. Aluminum will be marked with lead and brass with pink. Red, white, and yellow will be used to mark various types and grades of heat-treated and semi-finished steels. The colors have been used by the Navy with complete satisfaction for the past 15 years, and will presumably be adopted by all departments soon. This method of identification is offered as a basis for a similar marking system for the use of industry and offers a simple means of distinguishing metal billets and bars.

Market Data Handbook To Give Industrial Data

By Our Washington Correspondent

So much emphasis has been placed on consumer goods in the projected census of distribution that some apprehension is felt that industrial goods will not receive adequate consideration. From the dollar standpoint, the sales of industrial goods, estimated at 35 billions, are almost as important as the sales of consumer goods, totaling 40 billions. Much has been said concerning the introduction of scientific methods in the distribution of consumer goods that applies with equal force to the distribution of goods to industry.

Now on the press at the Government Printing Office is a market data handbook compiled by the Department of Commerce in which, for the first time, the data contained in the census of manufactures will be presented, not only by states, as in the 1927 census reports, but by counties. Presented in this way, the census reports will be of practical use in market analysis to manufacturers in one industry who sell their products to manufacturers in other industries.

* * *

Foundry Equipment Orders Show Consistent Increase

Gross foundry equipment orders for July were greater than they have been since August of last year, according to a report issued recently by the Foundry Equipment Manufacturers' Association, made up from data submitted by 20 manufacturers of foundry equipment. The index number for July was 219.3, on a base considering the average monthly shipments for 1922-24 as 100. The three months' average of gross orders index is 191.4, as compared with 193.1 for July of last year and 121 for July, 1927. The index of unfilled orders has shown a consistent increase since 1926, the date of the first survey. Beginning at 177.1 in July, 1926, the index has risen through 222.6 in July, 1927, and 332.1 in July, 1928, to 368.7 in July of this year, an increase of 67.9 over the preceding month.

* * *

Census Advisory Group Asks for Suggestions

With the intention of making the forthcoming census of manufactures as responsive as possible to the need of industry for accurate information concerning its own activities, the special advisory committee designated by Secretary Lamont has requested manufacturing organizations, trade associations, and individual manufacturers for advice and suggestions as to the form of the schedule to be used in the enumeration. The subjects covered by the schedule used in the 1927 census are: Description of establishment, character of industry, time in operation, persons engaged, salaries, wages, and materials, products, power and coal consumed. The committee has invited suggestions concerning the form of questions under all of these subjects except production, which will be taken up directly by the Bureau of the Census with the industrial associations. Comments on the general schedule should be sent to the Secretary of the Committee, Thomas W. Howard, 1615 H St., Northwest, Washington, D. C., as promptly as possible in order that they may be given consideration by the committee preparatory to recommending the revision of the schedule.

* * *

Increases in Earnings Reported by Companies

The Westinghouse Air Brake Co. reported the greatest earnings for any quarter of the year since June, 1927, for the three months period just completed. Profit of $2,123,539 for the second quarter gave earnings of 67 cents a share on common stock, in comparison with $1,924,893, equivalent to 60 cents a share for the preceding quarter and with $1,492,382, or 47 cents a share, for the same quarter of 1928. Net profit for the first half was $4,048,432, or $1.37 a share, in comparison with $2,940,350, or 92 cents a share for the first half of 1928.

The Timken-Detroit Axle Co. reports net earnings of $880,708 for the first six months of this year, as compared with $716,410 in the corresponding period of 1928. This is equal to 76 cents a share on the common stock, as compared with 70 cents a share on the common stock during the first half of 1928.

The St. Louis Screw & Bolt Co. reported earnings of $5.18 per share of common stock for the year ending June 30, and declared a common stock dividend of $1.50, an increase of 50 cents over the last annual dividend.

The Bridgeport Machine Co. reported a profit of $93,669 for the six months period ending June 29. Stock outstanding consists of $406,900 preferred stock and 150,000 shares of common stock.

Aluminum Industries, Inc., Cincinnati, Ohio, reported earnings for the first six months of 1929 amounting to $175,113 which is equal to $1.75 a share. This figure compares with earnings of $1.90 a share for the entire year of 1928.

The Wolverine Screw Co., Detroit, Mich., reports earnings for the first half of 1929 of $89,569.59 net after all charges, including federal income tax. This is equivalent to about $1.20 a share on the 75,000 shares of common stock outstanding.

The American Machine & Foundry Co. estimates 1929 profits of $10.50 a share, as compared with profits of $6.56 a share in 1928.

BUSINESS BAROMETER

Change of governmental attitude toward "big business" has resulted in greatest of American booms

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

GOVERNMENTAL attitude toward big business has changed; it is now regarded as less objectionable than formerly. The result has been the greatest boom that America has ever seen, and it must be admitted that "tight" money is the only repressing factor that is in sight at present. Although credit with which to carry securities still costs between 7 and 10 per cent, this rate is without much effect, as it has been during the past year, and, as heretofore, those who are buying securities do so in the expectation that their profits will overcome the cost of carrying them. But some New York economists have estimated that loans on securities in this country now total more than $18,000,000,000, and people are commencing to wonder where all the money borrowed by stock brokers comes from.

To this question a Western banker recently gave one answer by estimating that American corporations and individuals theoretically can lend to security buyers three or four times as much as they are lending at present. And there is no doubt that a good deal of foreign capital is on deposit in New York, and that more is likely to be attracted by the advance in the Federal Reserve rediscount rate. For these reasons there are some who expect a slight decline in the rate for call money. They point to the gold that London is now sending us as a vindication of their predictions. If they are right, the public may be reattracted to the stock exchange, from which there were many absentees last week despite the gyrations of the steel stocks and a few other favorites, over which the ringmasters of speculation cracked their whips in an effort to revive the interest of an audience that seems to have become a little weary of the circus. It is hardly necessary to say much more about the stock market. One man's opinion in regard to its future is as good as another's. Even the super-optimist concedes that the upward movement must come to an end some time. Predictions vary only with regard to the duration of a boom that has lasted longer than any that preceded it.

Meanwhile, trade reports are re-assuring. Most statistics indicate that sales of merchandise are ahead of those of last year, and car loadings are larger than ever before in our history. The major industries are very active. July building contracts exceeded those of a year ago by 12 per cent. Steel orders and production are declining slightly, but the latter is still only a few points below capacity. It is expected that August automobile output will be larger than that in July, and, of course, much greater than that in 1928. Some cotton mills are shutting down a week a month, but the statistical position of the goods market is strengthening. The various commodity markets have moved up and down normally in response to the influences to which they are susceptible and there has been a considerable revival of speculation in grain, especially in corn, which recently climbed back to over $1 a bushel for September delivery. Such prices naturally make the farmer feel more cheerful, and encourage the merchants with whom he trades to increase their stocks.

It is announced that the Farm Relief Board has succeeded in effecting a combination which will include fruit growers' "co-ops" doing an aggregate business of $50,000,000. A similar combination of cotton "co-ops" handling more than 1,000,000 bales of cotton is said to be in the making and if it is consummated the ease with which prices can be stabilized will be greatly increased. The cotton market itself, while lower, has been remarkably steady when the brilliant crop outlook is considered, and the prospect of a big yield is losing some of its terrors. The demand for cotton goods in the United States is quite active. Cables from Lancashire report that the cotton strike there will be settled by arbitration as a result of Premier MacDonald's intervention, and resumption of work pending the arbitrators' decision is expected. The rubber markets are easy upon the continued large imports and the prospect of declining consumption. Most of the staple commodities, however, are still firm.

The foreign news is not wholly pacific. Philip Snowden appears to have won some concessions for England as a result of the row he raised over the Young Plan, and perhaps France will accede to most of the British demands, but a drawn-out conference that will be on the verge of breaking up many times is likely.

The Far Eastern situation is also less placid as the negotiations between China and Russia run into difficulties, and further military movements are reported. But the process of bargaining often gives the appearance of disaster where none really threatens. Meanwhile, plans to reduce armaments are being promoted in many quarters of the world and as the cause of peace gains new adherents and provokes more enthusiasm, there seems to be no reason why the world's business should not continue to grow.

From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page.

PREDICTIONS of a seasonal decline which have been made for the past two months seem to be partially applicable in the metal-working industry at the present time. A moderate slump in orders has occurred, but is a result of the absence of executives on vacation rather than any recession, since inquiries are holding up very well. Deliveries are as bad as ever, but some improvement is anticipated in the near future.

CHICAGO reports little change, with industries and general machine shops providing most of the business, and railroads doing limited buying. New England reports a good volume of orders and inquiries for small machines with the radio, electrical household equipment, and automobile industries keeping the market busy. A large transportation company has just ordered 8 Savoia Marchetti flying boats at a cost of $695,000. There is no recession evident in New England or in Cincinnati. Detroit, New York, Indianapolis, and the Southern District are experiencing the usual seasonal decline, with good prospects for the fall. Indianapolis announces the best summer average in years, and New York expects a good summer total. The textile industry is buying in the Southern District; little other activity is evident. Detroit considers August the poorest month in the last year and a half, but automobile orders are expected in the future. One New York company reports sales of fifteen machines during the past week, but the rest are momentarily quiet.

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THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

CINCINNATI

Machine-tool manufacturers in the Cincinnati district report that in the past week business has held up remarkably well for the season. In several cases a slight increase in sales was reported, comparing it to the previous week, and in the few cases where there was a falling off it was said to be negligible.

All agree that the demand was good for the midsummer season. The common feeling is that the sales curve will begin to rise as soon as the vacation period is over, and the forecast of many is that the demand will become heavy. Selling agents report a slight lull in the past week, owing to the fact that buyers and also salesmen are taking a vacation. The forecast in this branch of the trade is that in a short time the market will liven up in local and adjacent territory.

All of the manufacturers received a good volume of inquiries in the week, and according to some the number was very large for the time of the year. The majority of these came from general machinists and miscellaneous users, located in all sections of the country, and in most cases the requirements were single tools and replacements.

CHICAGO

Conditions in the machine-tool industry vary but little from those last reported. Some recession has been noted in a few lines, but the average of bookings compares favorably with that of the last few weeks. Many orders are reported as pending, awaiting only the close of the vacation season and the return of officials and executives possessing the authority to close sales. As an instance of this situation, it may be mentioned that at the local office of one large midwestern tool-building concern, negotiations for machinery totaling $25,000, approved by shop superintendents, need only the signatures of two absentee directors, now on vacation, to close the transaction. Industries and machine shops throughout the Chicago area and nearby states are reported to be providing most of the business now being done, the orders coming from scattered scources. Railroad buying, as for the last several weeks, is on a very limited scale. Manufacturers of farm machinery and tractors are gradually increasing their inquiries for equipment. Demand for used tools has lessened. Forecasts regarding business in the near future are to the effect that not material upward trend may be looked for much before the middle of September.

NEW YORK

New York machine-tool and machinery dealers report a quiet week, with demand holding up and inquiries good, but little actual signing of orders because of the absence of officials on vacation. The rush of inquiries of the past few weeks has dropped off, probably also a result of the vacation period. Price levels are the same, and deliveries have shown little improvement. One machine promised for delivery in 3 weeks on April 2 was shipped from the factory on August 12. One line of shapers is promised for 6-month delivery, and a line of boring machines for January delivery.

Orders continue to be mainly small ones for single tools and replacements, with the railroads showing a little more interest than they have. The New York Central railroad is buying a small amount of equipment, and the electrical and bearing industries are also buying. Textile machinery companies are busy supplying a new demand for textile equipment, but most other machinery companies are working on backlogs to improve delivery.

Distribution of orders may be shown by an unusual list sold by the Triplex Machine Tool Co. during the past week: 1 Swiss jig borer, 2 Edlund drill presses, 1 large surface grinder, 1 small surface grinder, 1 bench lathe, 2 hand milling machines, 5 Mikron gear hobbers, 1 automatic tapping machine, 1 general flexible power press.

INDIANAPOLIS

A little slump in the machinery and machine-tool business was noted here during the past week. The slump is seasonal entirely, according to manufacturers and dealers, and is not nearly so marked, nor so soon in appearing, as had been expected. This summer promises to be one of the most prosperous summers the trade has enjoyed for some years. Some manufacturers, particularly those dealing in heavy lathes and similar equipment, report a good demand and have sufficient orders ahead to permit production well into the late fall months.

One cause for the slump in tools has been the unfavorable reaction of the local automobile trade. Production has fallen off during the last month and the factories have few requirements to meet. The railroad demand also appears to be slumping somewhat. With the arrival of the wheat harvest the roads are keeping their motive power on the road as long as possible and some shops in the state have laid off men.

An increasing demand continues to come from the aviation interests of the state. The demand for small equipment to be used for making airplane repairs is surprising to the trade, and the business apparently is just starting.

NEW ENGLAND

A good volume of orders for small machinery was booked in the New England section during the past week, and business generally is active at a trend moderately above the season average. The automobile and radio industries are keeping New England tool shops working day and night, and electric household equipment manufacturers have also been buying.

The aeronautical field is taking a good volume of heavy equipment, and orders from this source are promising. The Airvia Transportation Co. has placed an order with the American Aeronautical Corporation for eight Savoia-Marchetti flying boats at a cost of $695,000. Improved delivery on most lines of tools has not materialized. Buyers expect little or no definite improvement for some time, and have begun to place their new business accordingly. Inquiries hold up well and recent wants include presses, boring and turning mill, grinders, radial drills, universal miller, shaper, turret lathes, and a variety of engine lathes. School boards in Providence, Pawtucket, and Central Falls, R. I., are anticipating the purchase of metal-working and wood-working equipment for manual training purposes.

CANADA

Midsummer recession in the metal-working field in Canada is less pronounced than in any year since 1921. This is a reflection of the unusually high level of business during the first half of the current year. In no previous period has there been such a rapid increase in manufacturing. The increase in the output of iron and steel has been substantial and that of motor vehicles has surpassed all previous records. Manufacturing plants are now turning out in physical volume approximately 140 per cent of the output reached at the peak of war-time activity ten years ago. The Canada Machinery Corporation, Galt, Ont., reports much increased activity during the last few months. The company has several big orders on its books at present, and the outlook for the next few months is bright. The plants of Canadian Vickers are very active at present. The National Steel Car Corporation is beginning to reap the benefit of recent plant additions. The company now has excellent facilities for production of the $20,000,000 worth of orders which are still on its books. Latest developments in the expansion program of the Steel Co. of Canada call for the erection of a half-million dollar galvanized wire plant at Hamilton next year. In addition to galvanized wire, barbed wire and other fencing will be manufactured.

DETROIT

August has proved to be the dullest month of 1929, and machinery and machine-tool dealers in Detroit are looking for little improvement before the middle of next month. The level of business in this district was low in July compared with the levels of any of the past 18 months, but August is apparently much lower.

At present, dealers are making plans for heavy fall business in the automobile and accessory field. The fall is always a good period here and it is confidently believed that this one will be better than usual. Automobile production is a little lower than last month because of the many new models that have just been brought out. It is likely that there will be an increased demand for machinery and tools when the manufacturers get into heavy production on these models.

The business of the past ten days has consisted mainly of replacement machinery. Some fairly good-sized sales have been made to steel companies in this district. The equipment is to be used in maintenance work. In one case the orders amounted to nearly $60,000. General business is fairly good, although the vacation period has slowed things up somewhat. The increasing importance of the automobile export business is having a edifying effect on conditions here.

SOUTHERN DISTRICT

Though the usual seasonal decline is apparent in the machinery and machine-tool field in the Southern district, dealers state that inquiries continue to show improvement and that reports from salesmen

in the field are growing steadily more optimistic over the outlook for late summer and fall demand.

At present, there is comparatively little demand reported in the machinery or machine-tool list with the volume of new business showing a lower average than at this time last year, although for the first seven months of 1929, sales were almost on a par with those of the first seven months of 1928. Should business be as good as expected the last four months of this year, the 1929 volume will show a fairly good increase over that of 1928.

Some orders are still being placed by the textile industry, which is investing millions in new mills and mill expansion in the Southeast this year. Railroads are also placing a few orders for heavier equipment for new shop projects. Some sales of woodworking machinery are reported in the lumber and furniture field in the Georgia, Carolina, and East Tennessee district, outlook considered quite satisfactory. Smaller machine shops and garages are buying very little at this time. Hardly any orders are reported for other than used or rebuilt equipment, although the outlook is good. Road-building and construction machinery and equipment is quiet and this is about the only line for which the outlook is not very promising.

Business Items

The Goslin-Birmingham Manufacturing Co. has been formed at Birmingham, Ala., by a merger of the properties and interests of the Birmingham Machine & Foundry Co., 3700 Tenth Ave., North, that city, and the Joubert & Goslin Machine & Foundry Co., 800 North 35th St., Birmingham. The two companies manufacture machinery for use in sugar mills, and will expand production facilities as a result of the merger.

The Cadillac Motor Car Co., Detroit, has opened a $1,000,000 engineering building as a part of its $5,000,000 expansion program, begun last spring. The building is a complete automobile research laboratory, and will house a staff of 300 engaged in research and design exclusively.

The Southeastern Manufacturing Co., organized and incorporated recently at Orlando, Fla., is reported to be contemplating the establishment of a factory in that city for the manufacture of electrical machinery. J. G. Johnson, M. D. Kennedy, and J. H. Johnson, all of Orlando, are the incorporators.

The Western Electric Co. has moved the toolmaking department of the Kearny works of the company to Newark, where production will soon be begun on an increased schedule.

Ottenheimer Bros., Hillen St. and Fallsway, Baltimore, are planning a plant addition.

The Davis Iron works, 301 President St., Baltimore, will begin work this fall on a plant addition.

The General Radio Corporation, Eighth St. and Ashland Ave., Baltimore, is equipping its plant for the manufacture of parts for radio sets.

The Gilson Bros. Co., Fedonia, Wis., has been incorporated to manufacture concrete mixers and similar machinery.

The L. G. Henes Machinery Co., San Francisco, has been merged with the Jenison Machinery Co. of that city and will now be known as the L. G. Henes Machine Tool Division of the Jenison Machinery Co. Present offices and show room are situated at 58 Fremont St., but will be removed to 20th & Tennessee Sts. upon the completion of the first unit of a three-unit, all-steel building now being erected.

The Uniheart Universal Tool Co., organized and incorporated recently at Muscle Shoals, Ala., with $100,000 capital, has acquired a building at Muscle Shoals and installed equipment for the manufacture of a newly patented toolholder and other metal products. Arthur T. Stark is president and Robert H. Visger, Chicago, is secretary and treasurer. Sales headquarters are in Chicago.

The Stanley Works, New Britain, Conn., has acquired the R. L. Carter Co., Inc., Phoenix, N. Y., and will operate it as a separate unit. Fred O. Fuller of the purchasing department of the Stanley Works, New Britain, has been transferred to Phoenix to manage the business. The Norton Co. has moved its Chicago offices from the first to the second floor of its building, 11 North Jefferson Street.

The Williamsport Wire Rope Co., Williamsport, Pa., which has had a temporary plant at Sparrows Point, Baltimore, will erect a one-story factory building 100 x 180 ft. at Edgemere, near Sparrows Point. The plant, which will be completed before the end of the year, will have a capacity of approximately 20,000,000 ft. of wire rope a year. George R. Shephard is manager.

The Southern Aviation Enterprises, formed recently by a group of prominent Atlanta business men with headquarters in the Palmer Bldg., Atlanta, Ga., has announced plans for the erection of an airplane factory either at Birmingham, Ala., or New Orleans, La., for the manufacture of a five-passenger, heavy-powered, cabin plane, and also a small sport plane.

The P. H. Schindler Machine Works, 423 Poydras St., New Orleans, La., advises that this company has leased a building at 623 S. Peters St., that city, and is establishing at this location a modern machine shop, which will be largely equipped with new machinery.

The Turner Tanning Machinery Co., Peabody, Mass., has leased a new building containing 10,000 sq.ft. of space for its new plant, to replace the one which will be demolished in the course of the new Pennsylvania Railroad station development in that city.

The Western Electric Co. has started to build a plant on its Chicago property to be utilized in the manufacture of a new type of telephone cable. The structure will be 204 x 95 x 40 ft., and the new machinery to be installed will cost $300,000.

The Michiana Products Corporation, recently organized, of Michigan City, Ind., has taken over the properties of the Chrobaltic Tool Co. and the Sheet Steel Product Co. of that city and will continue the business and enlarge the facilities of both concerns. The present operating and sales organizations will be maintained except that R. O. Gill has resigned. O. M. Carry is president, with offices in Chicago, and W. B. Sullivan, first vice-president and general manager, will be located at Michigan City.

The W. B. Foshay Co., Minneapolis, Minn., has acquired control of the Northern Pump Co. of that city and will continue to operate it as at present with J. B. Hawley, Jr. remaining as president and general manager.

American Cirrus Engines, Inc., is contracting for the installation of machinery in the former plant of Wills-Ste. Claire Automobile Co., Marysville, Mich., for the manufacture of crankcases for American Cirrus engines.

The Ingram Manufacturing Co. has acquired a building at Warrensville, N. C., and is moving the machinery and equipment from the former plant at Baltimore, Md. Capacity of the plant will be about 3,000 attachments for automobile pumps per day.

The Wise Manufacturing Co. is the new name of the recently reorganized Standard Die & Tool Co., 8th and Carlton Sts., Berkeley, Calif. Roy T. Wise is president and general manager, and there has been no change in the personnel.

The Davis Iron Works, 301 President St., Baltimore, dealer in structural steel, will begin work this fall on an addition to its plant. Earl Davis is president.

The Black & Decker Manufacturing Co., has started work on a 2-story, 140 x 200 ft., plant addition. All the additional space will be used for manufacture. S. Duncan Black is president.

The Wagner Electric Corporation, St. Louis, Mo., has moved its Cleveland service station and branch sales office to a new building at 3756 Carnegie Avenue.

The Eclipse Interchangeable Counterbore Co., Detroit, Mich., has changed its name to the Eclipse Counterbore Company.

Clifton Reeves & Associates, industrial engineers, have moved their New York offices to 95 Liberty St., Singer Annex.

The Ohio Gear Co., Cleveland, Ohio, has appointed as its representative, A. R. Young, Indianapolis, for the territory of Western Ohio and Indiana.

The Lincoln Electric Co., Cleveland, Ohio, is building a 200x110 ft. addition to its present plant.

The Midland Steel Products Co., Detroit, has under way a $500,000 expansion program.

Personals

E. H. PARKHURST, vice-president of the Columbia Axle Company, Cleveland, has resigned from the Board of the Peerless Motor Car Corporation, Cleveland, according to J. A. Bohannon, president of the Peerless Co. Mr. Parkhurst was elected a director of the company at the annual meeting last year, and had previously served Peerless in an executive capacity for eleven years, ending with his resignation about 1914.

EDWIN KARLSON has been made vice-president in charge of production of the Peerless Motor Car Corporation, Cleveland. Mr. Karlson has been previously associated with the Cleveland, Chandler, Lozier, and Marmon Automobile companies. S. T. CREIGHTON, Indianapolis, formerly with the Marmon Motor Car Co., has been made purchasing agent of the Peerless Corporation.

C. E. HILDRETH, for several years general manager of the National Machine Tool Builders Association, has been named supervisor of the Worcester District during the national census beginning next April. Worcester has been selected as the headquarters of the Massachusetts census district and Mr. Hildreth will have 168 enumerators working out of his office.

W. E. HARRIS, formerly connected for some years with the Stephens-Adamson Manufacturing Co., Birmingham, Ala., has joined the staff of the Charles C. Steward Machine Co., also of Birmingham, and is now in charge of the power transmission department for the latter company.

M. A. GROSSMAN, chief research metallurgist for the Central Alloy Steel Corporation, Massillon, Ohio, sailed for Europe on August 9 to continue his study of the special European steels which the company is preparing to produce in this country.

MERRITT L. FOX, former assistant professor of mechanical engineering at the University of Iowa, has been appointed manager of the Research Experimental Department of the Houde Engineering Corporation, Buffalo, shock absorber manufacturer.

ALBERT L. SALT, formerly president and now chairman of the board of the Graybar Electric Co., has been elected a director of the Sullivan Machinery Co., Michigan City, Ind., and Claremont, N. H.

FRED A. CONKLE has been appointed railroad representative by the Lewis-Shepard Co., Boston, Mass. He was formerly associated with the New England Road Machinery Company.

WILLIAM E. DUNN, JR., who for several years has been the executive secretary of the Southern Metal Trades Association, Georgia Savings Bank Bldg., Atlanta, was elected executive secretary of the Southern Plow Manufacturers' Association at a convention held recently at Louisville, Ky., it is announced by Clyde L. King, head of the Atlanta Plow Co., Atlanta, president of the association. Headquarters of the organization will be in Atlanta, and it is understood that Mr. Dunn will also continue as secretary of the metal trades body.

M. L. ECKMAN has been appointed general manager of the Taylor-Winfield Corporation, Warren, Ohio. For the past ten years Mr. Eckman has been welding supervisor for the Ford Motor Co. Under his supervision, the welding department of the Ford Co. has been called the world's foremost welding

laboratory. The unusual welding employed in building the Ford Model "A" car is also largely the result of work carried on by Mr. Eckman. He has worked his way up through the ranks as machinist, tool maker, designer, machine builder. Mr. Eckman's offices will be at Warren, Ohio, where the main plant of the company is located.

CURTIS C. WATTS, formerly in the sales organization of the Black & Decker Manufacturing Co., Towson, Md., has been appointed assistant advertising manager of the company.

A. H. COREY, factory engineer of the Piston Ring Co., Muskegon, Mich., has resigned to become general manager of the piston ring department of Aluminum Industries, Inc., St. Cloud, Minnesota.

CARL C. CONWAY, president of the Continental Can Co., has been elected a director of the United States Rubber Company.

E. R. S. REEDER has been appointed manager of special contracts, Widia department, Thomas Prosser & Son, New York City.

Obituaries

MERTLAND MCCLAIN HEDGES, one of the pioneer foundry and machine shop operators of the southeastern district, died at Chattanooga, Tenn., a few days ago at the age of 69 years, following a protracted illness. Mr. Hedges was one of the founders of the Casey-Hedges Boiler Co., Chattanooga, which became one of the largest industries of its kind in the South, and was some time ago merged with the Walsh & Weidner Boiler Co., also of Chattanooga, at which time Mr. Hedges retired from active business life. He was for a number of years a prominent member of the Southern Metal Trades Association, and an officer in this organization.

ALFRED H. COWLES, 70, president of the Electric Smelting & Aluminum Co., Sewaren, N. J., died on August 13 at his home in that city. Mr. Cowles is credited with inventing the process whereby aluminum in commercially-profitable quantities could be produced, and also with developing the electric furnace. He was a member of a number of scientific and research societies, and had received many honors in recognition of his contributions to science.

EDWARD NEWBEGIN, president of the Multnomah Iron Works and also president and manager of R. M. Wade & Company, dealers in agricultural implements, Portland, Ore., died in that city on July 25 of heart disease.

Forthcoming Meetings

NATIONAL METAL CONGRESS. To be held in Cleveland September 9 to 13. Simultaneous meetings of the American Welding Society, the Institute of Metals Division, American Institute of Mining & Metallurgical Engineers, Iron & Steel Division, American Society of Mechanical Engineers, the Iron & Steel Division, A.I.M.E., and the American Society for Steel Treating. W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

NATIONAL METAL EXPOSITION. Eleventh annual, held under the auspices of the American Society for Steel Treating, Cleveland Public Auditorium, Cleveland, Sept. 9-14. W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland.

AMERICAN RAILWAY TOOL FOREMEN., Annual convention at Hotel Sherman, Chicago, September 11 to 13. C. C. Ziegler, secretary-treasurer, 611 West Washington Blvd., Chicago.

MACHINE TOOL BUILDERS EXPOSITION. Under the auspices of the National Machine Tool Builders Association, Sept. 30 to Oct. 4, in the Public Auditorium, Cleveland, Ohio. Ernest F. DuBrul, general manager, 1415 Enquirer Bldg., 617 Vine St., Cincinnati.

SOCIETY OF INDUSTRIAL ENGINEERS. Sixteenth national convention at Hotel Statler, Cleveland, October 23 to 25. Requests for programs should be sent to S.I.E. national office, 205 West Wacker Drive, Chicago.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION. Semi-annual fall meeting at the Benjamin Franklin Hotel, Philadelphia, October 24 to 26. T. W. Owen, secretary, 3608 Euclid Ave., Cleveland.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

STRUCTURALS, plates and sheets are the three forms of steel now in greatest demand. Railroads are buying most of the structurals, Western oil and gas pipe-line work is absorbing the bulk of current plate tonnages, and the general consuming trade, exclusive of automotive, appears to be responsible for the large volume of business in sheets. Blue-annealed sheets are up 15c. per 100 lb. ($2.35) base, Pittsburgh, and black, 10c. ($2.85) base, compared with last week's prices. Quotations on heavy hot-rolled material remain unchanged. Non-ferrous metals prices hold steadily except in the case of pig lead which declined 5c. per 100 lb. ($6.55) at East St. Louis. Leather belting discounts at New York warehouses have been lowered five points.

(All Prices as of Aug. 16, 1929)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$18.44
Northern Basic	20.89
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 1.75@2.25)	20.75
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	14.50
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.26@21.76
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.51
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20.26
Basic	20.26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.35	3.35	3.30	3.90†
No. 12	2.40	3.45	3.35	3.95†
No. 14	2.50	3.55	3.45	4.00†
No. 16	2.60	3.65	3.55	4.10†
Black				
Nos. 18 to 20	2.65	3.85	3.70	3.80
No. 22	2.80	4.00	3.85	3.95
No. 24	2.85	4.05	3.90	4.00
No. 26	2.95	4.15	4.00	4.10
No. 28	3.10	4.75	4.15	4.25
Galvanized				
No. 10	2.70@2.80	4.20	4.05	4.05
Nos. 12 to 14	2.80@2.90	4.30	4.15	4.15
No. 16	2.90@3.00	4.40	4.25	4.25
No. 18	3.05@3.15	4.55	4.40	4.40
No. 20	3.20@3.30	4.70	4.60	4.55
No. 22	3.25@3.45	4.75	4.65	4.60
No. 24	3.50@3.60	4.90	4.75	4.75
No. 26	3.65@3.75	5.15	5.00	5.00
No. 28	3.90@4.00	5.40	5.25	5.25

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Glav.
1 to 3 in., butt welded	50%	36%	55½%	43½%	54%	41%
2½ to 6 in., lap welded	45%	32%	53½%	40½%	51%	38%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	—Diameter in Inches— External	Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	.154
⅝	.58½	2.875	2.469	.203
¾	.76½	3.5	3.068	.216
⅞	.92	4.0	3.548	.226
1	1.09	4.5	4.026	.237
1¼	1.27	5.0	4.506	.247
1½	1.48	5.563	5.047	.258
2	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

— Thickness — B.w.g. and Decimal Fractions		Outside Diameter in Inches ⅛	¼	⅜	½	1	1¼	1½
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	4.15
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00
Cold drawn, round or hexagon‡	3.60	3.65	3.60
Cold drawn, flat or square‡	4.10	4.15	4.10
Structural shapes	3.30†	3.00	3.10
Soft steel bars	3.25†	3.00	3.00
Soft steel bar shapes	3.25†	3.00	3.00
Soft steel bands	3.75†	3.65	3.65
Tank plates	3.30†	3.00	3.10
Bar iron (2.75 at mill)	3.25	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, ¾-in. thick. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— 3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ¼, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			49.50
Lead, pigs, E. St. Louis	6.55	New York	8.00
Zinc, slabs, E. St. Louis	6.80	New York	8.25

	New York	Cleveland	Chicago
Antimony, slabs	11.00	12.25	14.25
Copper sheets, base	27.75	27.75	27.75
Copper wire, mill, base	19.87½	19.87½	19.87½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25.00*	24.30	24.30
Zinc sheets (casks).....	10.50@11.00	11.70	10.11
Solder (½ and ½).....	33.75	32.75	31@34
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			65.00
Commercial genuine, intermediate grade.....			48.00
Anti-friction metal, general service.....			31.50
No. 4 babbitt.....			12.00

*Delivered.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold rolled.....	53.00	40.00†
Tubing	75.00*	90.00
Angles, not rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Cold drawn.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars, depending on quantity offered for sale:

	New York	Cleveland	Chicago
Crucible copper.....	15.37½@15.50	13.50	13.00 @14.00
Copper, heavy, and wire..	14.12½@15.37½	13.00	12.00 @13.00
Copper, light, and bottoms	12.75 @13.50	12.50	11.00 @12.00
Heavy lead.....	5.25 @ 5.50	6.25	4.75 @ 5.25
Tea lead.....	3.50 @ 4.00	4.25	3.75 @ 4.25
Brass, heavy, yellow.....	8.25 @ 8.75	8.00	8.00 @ 8.50
Brass, heavy, red.....	12.00 @12.50	12.50	11.75 @12.25
Brass, light.....	7.00 @ 7.50	7.50	7.00 @ 7.50
No. 1 yellow rod turnings.	9.50 @10.00	9.00	9.00 @ 9.50
Zinc.....	3.25 @ 3.75	3.25	3.00 @ 3.25

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.*	$0.10@0.13½	$0.16	$0.15
Cotton waste, colored, per lb.*	.09@ .13	.12	.12
Wiping cloths, washed white, per lb.†.....	.16	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.027	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.136	.11	.144
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.75	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.35
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt...	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*All waste in bale lots. †100-lb. bales.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.036	.036	.034
Brass rods.....	per lb..	.2125	.2125	.17
Solder (½ and ½).....	per lb..	.3375	.325	.3225
Cotton waste, white...	per lb..	.10@.13½	.10@.13½	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1, 6-in. dia.....	per 100.	3.60	3.60	3.10
Lard cutting oil.....	per gal.	.75	.75	65
Machine oil.....	per gal.	.33	.33	.30
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper.....	$4.86	$4.29	$4.29
Emery cloth.....	22.93	20.97	20.97
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper.....	2.08	2.04	2.04
Cloth.....	3.60	3.59	3.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton...	Connellsville,		2.75@2.85
Coke, prompt foundry, per net ton...	Connellsville,		3.75@4.85
White lead, dry or in oil...	100 lb. kegs....	New York,	13.75
Red lead, dry.....	100 lb. kegs....	New York,	13.75
Red lead, in oil.....	100 lb. kegs....	New York,	15.25

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, $\frac{7}{16}$-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$7.10
Cast iron welding flux, per lb., net.....	.40
Brazing flux, per lb., net.....	.80

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Mo., St. Louis—Utility Tool & Mfg. Co., 620 Tower Grove Ave.—plating generator, 6 to 12 v. 700 amp.; two kick presses.

O., Galion—H. B. Rummel Co., L. A. Cline, Mgr. (automobile and airplane parts)—machinery and equipment including two lathes, each 24 in., grinder, automatic machine, air compressor, etc., for new shop now under construction.

Ont., Brantford—A. G. Spalding & Bros., Edward St.—machinery and equipment for the manufacture of sporting goods for proposed 1 story, 50 x 163 and 80 x 100 ft. factory. Estimated cost $60,000.

Ont., St. Catharines—McKinnon Industries, Div. of General Motors Co. of Canada—machinery and equipment for the manufacture of automobile equipment and specialties for proposed first unit of plant, 1 story, 120 x 480 ft. Estimated cost $175,000.

Opportunities for Future Business

Calif., San Francisco—Pacific Gas & Electric Co., 245 Market St., awarded contract for a garage and meter repair plant at Folsom, Shotwell, 18th and 19th Sts. Estimated total cost $1,000,000. Noted June 6.

Calif., South San Francisco—Western Metal Products Co., 1160 Bryant St., San Francisco, awarded contract for the contruction of a 1 story factory. Estimated cost $25,000.

Conn., Bridgeport—Adley Co., 947 State St., is having plans prepared for the construction of a sales and service station on State St. Estimated cost $40,000. Private plans.

Conn., Bridgeport — Bassick Co., 33 Austin St., does not contemplate the construction of a factory. This corrects report in Aug. 1 issue.

Conn., Bridgeport—D. W. Flint, State and West Sts., is receiving bids for a 2 story, 110 x 300 ft. service station at Gilbert and Broad Sts. Estimated cost $200,000. Fletcher-Thompson Inc., 542 Fairfield Ave., Archt.

Ill., Chicago—Chicago Steel Tank Co., West 66th St. and South Narragansett Ave., has work under way on a 120 x 500 ft. addition to plant. Foltz & Co., 510 North Dearborn St., Archts. and Engrs.

Ill., Chicago—Dallas Brass & Copper Co., 820 Orleans St., awarded contract for three new building units as additions to rolling mills; addition to brass mill and two new buildings for carpenter shop, engineering department and machine shop at 6607 West Grand Ave. Estimated cost $500,000.

Ill., Chicago—Lapham Hickey Co., 3333 West 47th St., manufacturers of steel products, awarded contract for a 1 story, 143 x 177 ft. factory. Estimated cost $35,000.

Ind., Kokomo—F. D. Miller, awarded contract for the construction of a 1 story, 100 x 204 ft. garage and service building at Buckeye and Superior Sts. Estimated cost $60,000.

Ky., Louisville—Hurry-Up-Broadway Co., 329 Broadway, plans the construction of a 1 story, 90 x 160 ft. garage at Jackson St. and Broadway. Estimated cost $100,000. Brinton B. Davis, Columbia Bldg., Archt.

Md., Baltimore—M. J. Barry, Lanvale and Charles Sts., awarded contract for a 1 story, 50 x 200 and 16 x 100 ft. automotive service building at Lanvale and Morton Sts. Noted July 11.

Md., Baltimore—Guilford Realty Co., G. E. Saulsbury, St. Paul and Lexington Sts., awarded contract for a 5 story, 56 x 186 ft. garage at 220 Guilford Ave. Estimated cost $155,000. Noted Aug. 1.

Mass., Boston—Estate of Z. T. Hollingsworth, c/o Mowl & Rand, 21 School St., Archts., awarded contract for a 1 story repair and service garage. Estimated cost $40,000.

Mass., Braintree (Boston P. O.)—**Parker** Wynot, Commercial St., awarded contract for a 1 story repair and service garage. Estimated cost $40,000.

Mass., Braintree (Boston P. O.)—P. Wynot, Commercial St., will soon award contract for a 1 story repair and service garage. L. S. Joslin, 339 Newbury St., Boston, Archt.

Mass., Malden (Boston P. O.)—R. C. Clark, 73 Center St., awarded contract for a 1 story, 60 x 190 ft. garage and repair shop at 105-107 Center St. Estimated cost $50,000. Noted July 4.

Mass., Mansfield—Town, W. P. McDermott, Chn. Bd. Selectmen, plans the construction of a garage and repair shop on Park Row. Estimated cost $40,000 to $50,000. Architect not selected.

Mass., Medford (Boston P. O.)—L. Tankle, 109 Myrtle St., Waltham, will soon award contract for the construction of a 1 story, 80 x 135 ft. repair and service garage on Mystic St., here. Estimated cost $45,000. Private plans.

Mass., Milford—G. H. Sherman, Main St., will build a 2 story, 50 x 100 ft. garage and repair shop. Estimated cost $50,000. J. T. Slattery, 134 West St., Archt.

Mass., Newton (Boston P. O.)—Newton Mortgage Corp., 91 Union St., Newton Centre, is receiving bids for a 1 story repair and service garage on Peabody St. here. Estimated cost $40,000. W. J. Freethy, 23 Commonwealth Ave., Newton, Archt.

Mass., Reading—S. R. Stembridge, 74 King St., is having plans prepared for a 1 story repair and service garage at High and Haven Sts. Estimated cost $40,000. Private plans.

Mass., Roxbury (Boston P. O.)—J. F. Haynes, 1342 Columbus Ave., will build a 1 and 2 story, 60 x 100 ft. repair and service garage on Columbus Ave. E. T. P. Graham, 171 Newbury St., Boston, Archt.

Mass., Wayland—Bd. of Selectmen, awarded contract for the construction of a 1 story repair and service garage at Cochituate section. Estimated cost $40,000.

Mich., Kalamazoo—Checker Cab Co., plans the construction of a 2 story, 320 x 520 ft. automobile factory. A. Kahn, 1000 Marquette Bldg., Detroit, Archt.

N. H., Dover—F. E. Grimes, awarded contract for a 1 story, 65 x 170 ft. repair and service garage. Estimated cost $40,000. Noted July 11.

N. J., Kearny (Sta. Arlington)—**Western Electric Co.**, 195 Broadway, New York, N. Y., will receive bids about Oct. 1 for 4 or 5 new buildings as additions to manufacturing plant here. Estimated cost $3,000,000 to $4,000,000.

N. Y., Brooklyn—Eberhard Faber Co., 37 Greenpoint Ave., awarded contract for a 5 story addition to factory for the manufacture of pencils, erasers, etc., on Greenpoint Ave. Estimated cost $50,000. Noted Aug. 15.

N. Y., Jackson Heights—J. Voorhees, Owner and Archt., 114 East 54th St., New York, plans the construction of 100 x 200 ft., service garage, 78th St. and Roosevelt Blvd. Estimated cost $150,000.

N. Y., New York—Cutler Hammer Co., South Blvd. and 144th St., plans the construction of a 6 story, 90 x 159 ft. factory. Estimated cost $250,000. B. Ahlers, 110 West 40th St., Archt.

N. Y., New York—W. S. Eckert, 62 Broadway, plans a 1 story, 100 x 100 ft. garage. Estimated cost $40,000. T. J. Lynskey, 2523 University Ave., Archt.

N. Y., New York — Excell Garage Co., C. Dages, Pres., 1227 Lexington Ave., plans a 4 to 6 story addition to garage at 163 East 84th St. Estimated cost $40,000. W. Shary, 22 East 17th St., Archt.

N. Y., New York—D. Gorden, 44 West 16th St., plans a 7 story, 42 x 84 ft. garage at 60 East 11th St. Estimated cost $60,000. I. Hamburger, 44 West 16th St., Archt.

N. Y., New York—Helkar Realty Corp., 1700 Harrison Ave., plans a 2 story, 87 x 125 ft. garage at Webster Ave. and 204th St. Estimated cost $40,000. M. Ort, 324 East 149th St., Archt.

N. Y., New York — Hudson Builders, L. Kolost, Pres., 85 Southern Blvd., plans a 2 story, 130 x 158 ft. garage at White Plains Ave. and Magenta St. Estimated cost $150,000. Margon & Holder, 18 East 41st St., Archts.

N. Y., New York—E. Marolo, 1412 White Plains Ave., plans a 2 story, 75 x 117 ft. garage at 215th St. and White Plains Ave. Estimated cost $65,000. J. J. Dunnigan, 2382 Grand Concourse, Archt.

N. Y., New York—McSim Realty Corp., B. Simberg, Pres., 1133 Broadway, plans the construction of a garage, service station, etc. at Boston Rd. and 170th St. Estimated cost $40,000. A. J. Simberg, 1133 Broadway, Archt.

O., Cleveland — Arcade Garage Co., A. L. Licker, Guarantee Title Bldg., awarded contract for a 1 story, 80 x 428 ft. sales and service station at 1950 East 105th St. Estimated cost $150,000. Noted July 4.

O., Cleveland—Cleveland Universal Jig Co., E. F. Patterson, Secy., 2005 Rockwell Ave., awarded contract for a 2 story, 80 x 105 ft. factory at 13328 St. Clair Ave. Estimated cost $6,000. Noted May 24.

O., Cleveland—Cream Cone Machine Co., J. W. Taylor, Pres., 1874 East 59th St., is receiving bids for the construction of a 4 story, 56 x 65 ft. addition to factory at 5800 Hough Ave. Estimated cost $50,000. Private plans.

O., Cleveland — Gogan Machine & Foundry Co., J. Gogan, Pres., 1140 East 55th St., awarded contract for a 1 story, 40 x 90 ft. addition to factory at East 55th St. and Homer Ave. Estimated cost $40,000.

O., Cleveland — Linderme Tube Co., Emil Linderme, Pres., 1291 East 53rd St., is having plans prepared for a 1 story, 60 x 100 ft. factory. Estimated cost $40,000.

O., Cleveland—Bruce MacBeth Engine Co., C. E. Curtis, V. Pres. and Mgr., 2711 Center St., plans the construction of a factory. Architect not selected.

O., Cleveland—National Bronze & Aluminum Foundry Co., J. H. Shafner, Pres., 8800 Laisy Ave., plans a 1 story addition to foundry at East 88th St. and Laisy Ave. Estimated cost $50,000. E. McGeorge, 3030 Euclid Ave., Archt.

O., Cleveland—Whiteway Stamping Co., H. S. Whiteway, Pres., 1201 East 55th St., awarded contract for a 1 story factory on East 70th St. Estimated cost $50,000.

O., Columbus—McClure-Nesbitt, J. McClure, Gen. Mgr., 503 East Main St., is having plans prepared for the construction of a 1 and 2 story, 86 x 165 ft. garage. Estimated cost $65,000. R. Sims, 55 East State St., Archt.

O., Dayton—Dayton & Troy Automobile Co., Second and St. Clair Sts., plans the construction of a 1 story, 100 x 220 ft. repair shop on West Monument Ave. Estimated cost $100,000. F. J. Hughes, U. B. Bldg., Archt.

Pa., Phila.—T. C. Lippincott, archt., 11 South 16th St., soon lets contract 3 story, 55 x 107 ft. garage, 103-12 Arch St., for D. Gordon, 340 North Broad St. Estimated cost $150,000.

R. I., Woonsocket—United Street Railway Co., 51 Main St., awarded contract for a 1 story, 94 x 175 ft. garage and repair shop on Park Ave. Estimated cost $60,000.

Tex., Amarillo—W. L. Martin Broom & Mop Co., 2501 Maple St., Louisville, Ky., is having preliminary plans prepared for a factory here. Private plans.

Wis., Wausau—Wisconsin Box Co., will build a 1 story, 124 x 240 ft. factory at Town Lane Rd. Oppenheimer & Obel, Wausau, Archts.

Ont., Renfrew—Renfrew Refrigerator Co., F. D. Vickers, Mgr., Raglan St., plans a 2 story, 80 x 130 ft. addition to refrigerator manufacturing plant. Estimated cost $50,000.

Ont., Windsor—W. S. Wilkinson, 243 MacEvans Ave., is having plans prepared for the construction of a garage on Mercer St. M. E. Brian, city engr.